IS JANUARY 1, 2000, THE DATE FOR COMPUTER DISASTER?

ARING

ᴊEFORE THE

SUBCOMMITTEE ON GOVERNMENT MANAGEMENT, INFORMATION, AND TECHNOLOGY

OF THE

COMMITTEE ON GOVERNMENT REFORM AND OVERSIGHT HOUSE OF REPRESENTATIVES

ONE HUNDRED FOURTH CONGRESS

SECOND SESSION

APRIL 16, 1996

Printed for the use of the Committee on Government Reform and Oversight

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(II)

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TUESDAY, APRIL 16, 1996

House of Representatives,
Subcommittee on Government Management,
Information, and Technology,
Committee on Government Reform and Oversight,
Washington, DC.

The subcommittee met, pursuant to notice, at 9:30 a.m., in room 2154, Rayburn House Office Building, Hon. Stephen Horn (chairman of the subcommittee) presiding.

Present: Representatives Horn, Flanagan, Davis, Blute, Fox, Tate, Bass, Maloney, and Peterson.

Staff present: J. Russell George, staff director and counsel; Mark Uncapher, professional staff member and counsel; Andrew G. Richardson, clerk; and David McMillen and Liza Mientus, minority professional staff members.

Mr. HORN. Good morning. I thought we would get through our opening statements. The hearing is about whether or not Saturday, January 1, the year 2000, is the beginning of the new century and a new millennium. It is not about that. It is about the fact that on that date there is a threat that faces the computer systems worldwide due to the change from the 1900's to the 2000's.

After midnight on the last day of 1999 computer systems here and abroad which use two-digit representations to signify will automatically flash from "99" to "00". Most current computer systems use software which employ two digits of six to signify the year, such as in "04/16/96." These systems are at risk of failing on Saturday, January 1, 2000.

Throughout the world, computer systems could interpret the digits "00" as signifying the year 1900, instead of the year 2000. Some systems may even misunderstand the digits to mean no date at all. The result of this could be, in effect, a global computer virus, with computer systems unable to send accurate information or even to function.

The potential problems are widespread. The systems impacted by this software glitch range from personal computers to the computer systems which operate at the Department of Defense.

An added dimension to this dilemma is the interdependency of computers and the information they utilize. Most computer systems receive information from multiple systems and sources. If one source does not correct its system and sends corrupted information to others, those agencies and firms which receive this infected information will end up with systems which could go haywire be-

(1)

cause of the transmission of corrupted information into their clean systems. Because of this interdependency, entire information infrastructures are subject to collapse.

The concept of this interdependency is easy to illustrate. It includes the act of transferring money by electronic means and collecting information for input into academic or medical data bases. It includes transferring information needed to send checks to eligible Government benefit recipients, and also of concern, information related to critical military missions.

The Congressional Research Service recently reported that there was a lack of awareness of the seriousness of this matter on the part of a great number of people in business and Government. It is my hope that today's hearing will join other recent efforts to inform the public about one of the most important challenges confronting us in our daily use of technology.

The expense involved in remedying this problem is enormous. Recent estimates, on an international scale, are as high as $600 billion, according to experts from the Gartner Group. For the Federal Government alone, the estimated cost is $30 billion. Our question is not only the adequacy of funding needed by the Federal Government to do this job in a timely way, but also the unintended human consequences if that job is not done. With the stakes as high as they are, today's hearing takes on an even greater meaning.

The witnesses before us will help us collect the facts. What are Federal agencies doing to prevent a possible disaster? Are they taking the necessary steps to identify where the problem lies? Are they providing the necessary human and capital resources to correct the problem?

We hope to find the answers to these and other questions during this session.

Our first witness this morning is Mr. Kevin Schick. He is a representative of the Gartner Group, a private sector consulting firm which has sounded the alarm on this issue. We will next hear from a user panel—representing the securities and transportation industries—which will be impacted greatly by this issue; and finally, we will hear from representatives of the Social Security Administration, the Department of Defense, and the Department of the Treasury on the Federal Government's current response.

I look forward to hearing from our witnesses on this most important issue.

I would now like to ask the gentleman from Virginia, Mr. Davis, who establishes the forum for this subcommittee, if he has any opening comments.

Mr. DAVIS. Thank you. I will be brief.

I want to commend you for holding this hearing. The issue of year-2000 conversion needs to be addressed now rather than at the last minute. As you know, computers have two-digit data fields and many will fail to work in the year 2000.

On the last day of 1999, computers in the United States and all over the world automatically flash "00"; these computer systems will interpret this as 1900, rather than correct it as the year 2000. We should set the standard and work with the technology and industry to address this problem before it occurs.

Think for a moment how dates play a part in each one of our lives and how the failure of a computer system or computer scanner to recognize and understand a date can affect us. Our driver's license may prematurely expire and the Social Security Administration may recognize 25-year-olds as 75-year-olds, and vice versa, without the conversion that is needed for the year 2000.

As all our computer systems in today's world throughout this Nation and around the world are interrelated and interdependent, the cost to prevent this monumental problem for the Federal Government alone may seem, on the face of it, impossible. I believe you will hear from our witnesses today that it is not just confusion that can result if we don't act now.

Mr. Chairman, I thank you once again and commend you for holding this hearing.

Mr. HORN. Thank you very much.

Let me just note for all witnesses, especially the witness on the first panel, that our procedure in the committee and the subcommittee is to swear in all witnesses; and when they are introduced, their testimony automatically becomes part of the record, their written testimony.

We would like you generally to summarize that testimony—not read it, summarize it. And I say it, and then they go on and read it.

Let me just say, it is much better in terms of communicating with the Members to look us in the eye and talk from the heart about these issues. We have got your full document. The staff will rummage through that for months, but we want to hear what the problem is. Tell us in your own words about the real problem.

Mr. Schick, our first witness, is the research director for the Gartner Group.

[Witness sworn.]

STATEMENT OF KEVIN SCHICK, RESEARCH DIRECTOR, GARTNER GROUP

Mr. SCHICK. Thank you. I would like to start by first identifying myself as one of those who created the crisis, but being in the industry for over 20 years as a programmer, I have used the two-digit date. And before you start looking for me, I wanted to admit that right up front.

What is the problem? How did we do this? Well, 20-plus years ago, disk storage was expensive, writing programs. Everybody had to come up with a standard, and we did. And in fact that standard was a two-digit year. We use two-digit years in our language; we graduated in '72.

It is—this is the year '96, and what's going to happen now is all that changes when you say "00". In fact we will have to say "2000". Just when we look at the way we use language, please appreciate that is the same thing that a computer is going to have to do.

We have implemented this throughout our infrastructure so here in North America, particularly in the United States—and it is global; we use computers for everything—we have written programs to handle everything. And in our business world, dates, the age of something—when did a transaction take place, when is the next transaction going to take place, when did we start computing inter-

ests in, when does my mortgage get paid off—all these things depend on dates; and subsequently this standard of using two digits is going to fail us.

It is a very simple arithmetic formula. If you take my birth date '54 and subtract it from '99, I am 45. You take my birth date from '00, I now become a negative 54. Many of our systems we drop that negative sign.

I now become 54; I am going to be treated differently by business systems. They are going to put me into existing business rules and applications, and they are going to try to handle me. I might get a cut in my insurance rate; I might have to pay more in my insurance rate; I might actually get to start collecting Social Security. I might be denied services that a 45-year-old would have gotten. I will get services that a 54-year-old would have gotten.

That is an interesting perspective until you start thinking about someone who is 54, who now becomes 45; they lose services that they should have gotten. Someone who is 75 years old that goes to the hospital and you want to look at their Medicare card, a hospital looks at them and says, you are 25 years old.

This is the story of you are looking at them, and you are 75, and you are saying, no, trust me.

But we all know how computers work. Challenge the electric company sometime on your electric bill and you will find out, no, this is how much electricity you used.

Being on the phone. It turns out that not only do we have a two-digit problem, but it only happens for a short period of time. In many systems, the phone systems, for example, will not work for 1 second in 2000—for just 1 second, that 1 second of going from 99 to 00. Unfortunately, that 1 second happens in 24 time zones, so as long as you are not on the phone before New Year's and as long as you don't call a time zone that is already in 00, you will be fine. But what a rule, and it won't work.

So as the failure starts to take place, how do we fix these things? What's the cost of failure versus what's the cost of stopping the problem from happening?

It comes down to risk. It really isn't a date problem. It really is a business problem. Over and over again I have to meet with executives and companies, and I have met this week with people from Government, from the White House and Congress. It is difficult to look at this problem and say how can dates cost $600 billion? But you have to understand, it is not a date issue; it is a basic issue. That is how it happens.

How do we use dates? We don't use dates; we use age. Land suddenly isn't as old as it used to be. It is worthless. Suddenly we are turning over land to people who shouldn't have received the land. That has a problem to it; we are not collecting taxes. Probably that means Government starts to shut down.

We are giving services to people who shouldn't receive services. That is one issue; it is when you take services away from people who should have received them. That is a tragedy. That is the scary part about the year 2000.

The bottom line on this is, it is a 25-year standard. We actually accomplished what we set out to accomplish. We have integrated all of our computer systems. We have made businesses highly auto-

mated. They communicate electronically; things move very fast. But we have a 25-year-old standard and the standard is a two-digit date. That is the problem.

[The prepared statement of Mr. Schick follows:]

Kevin Schick
Research Director
Gartner Group

Reader Notes

1 What is the Year 2000 crisis and what does it mean to me?

2 How does a company get started for the Year 2000?

3 What strategies should applications development and maintenance organizations use to effectively coordinate and address the Year 2000 date change?

The Year 2000 date change is the first time in the history of the IT industry that an issue must be addressed by ALL organizations, and these organizations must address that issue within a specific TIME HORIZON. Application development and maintenance organizations are faced with three choices: 1) ignore the Year 2000; 2) attempt to rewrite all applications and change all affected data; or 3) establish strategies that understand, scope and apply solutions based on business drivers and opportunities. Year 2000 date change strategies that integrate with development initiatives and are supportive of business requirements will result in applications that evolve with the needs of the business.

Many organizations have awoken to the year 2000 date change crisis. Some are still asleep at the wheel. This session explores the issues, risks, and solutions surrounding this very real, very large problem. The call to action is now, Start in '96 or be part of the crash of '00!

What is the Year 2000 crisis and what does it mean to me?

Source   Gartner Group

Three Certainties: Death, Taxes and the Year 2000

The year 2000 date change poses one of the most significant challenges ever faced by the IT industry and will have enormous impact on business applications, package solutions and systems software, even putting some companies at risk in their business. The crisis is global, that is, after 25 years of using a two-digit de facto standard for representing the year in dates, all companies are at risk, all software and data must be validated, and no-one is to blame. The crisis centers around three considerations: time horizons, cost and risk. Time horizon is the projection period, forward or reverse, of a calculation and when it will fall relative to the Year 2000. Cost is the price tag associated with the solution and the opportunity cost of initiatives that may need to be delayed while focus is put on the year 2000. Risk is not having a complete inventory of the systems and environment and not relating this information to pertinent business values. The bottom line is the year 2000 virus is the most devastating virus ever to infect our business and IT systems!

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Without corrective measures, 90 percent of all applications will fail and/or create erroneous results by the year 2000 (0.9 probability).

Reader Notes

EXAMPLE	YY	CCYY
Sorting:	00, 01, 98, 99	1998, 1999, 2000, 2001
Calculation:	99 - 54 = 45 00 - 54 = -54	1999 - 1954 = 45 2000 - 1954 = 46
Validation:	960501 > 000501 Expired	19960501 < 20000501 Valid
Display:	05/25/00	05/25/2000

date stored as a 2-digit field

birth year 54

date stored as a 4-digit field

birth year 1954

Source   Gartner Group

Key Issue: What is the Year 2000 crisis and what does it mean to me?

Application failures include the obvious, programs abnormally ending, and the tragic, invalid or incorrect results that are not detected and yet are utilized for decision making. The former is easy to spot, the latter is only identified when the results fall outside of an expected range or value/response. When addressing the Year 2000 the INSPECT process brings value to understanding applications, business functions and environment considerations.

Solutions include the operating system date being in a format that includes the century. The correction of the calculation that uses date fields in the application. The expansion of date fields in the datastores. Data solutions are more expensive and include correcting the data and the applications that must now accommodate a four-digit year field.

Through 1999, the year 2000 date change, given the scope of affected systems and platforms, will cost between \$300 billion and \$600 billion within the global market (0.7 probability).
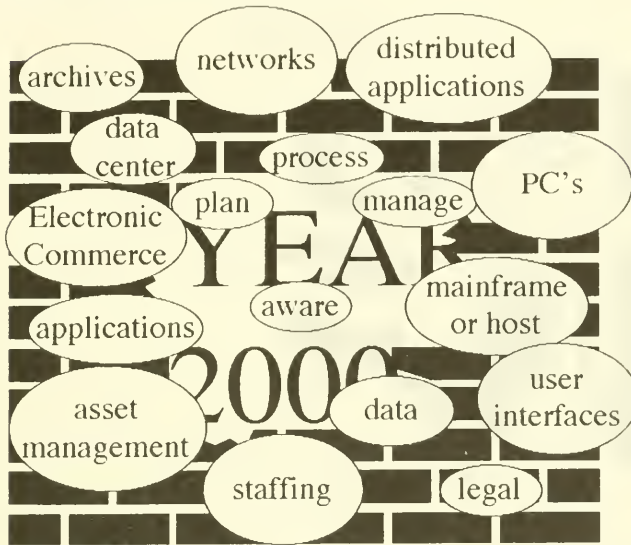
Source Gartner Group

Key Issue: What is the Year 2000 crisis and what does it mean to me?

Many believe the Year 2000 date issue is a mainframe or a legacy application and/or database problem. There is a presumption that PC's and newer development languages do not have the Year 2000 date problem. Wrong!

Unless the development organization addressed the Year 2000 century indicator the applications are at risk regardless of application type, DSS (Decision Support System), Back Office or OLTP (On-line Transaction Processing), application age, platform - PC's and mainframes, and particularly user interfaces.

End users may be confused by a two digit date that is represented as "00". Adding the century indicator may result in screens and reports that are cluttered beyond the ability to use them. And existing purchased software may not be compliant. What will you do...

When addressing the year 2000, the data center will be the most impacted organization within IT.

Reader Notes

Source Gartner Group

Key Issue: What is the Year 2000 crisis and what does it mean to me?

MIPS: already at 90% plus, now add compiles, year 2000 compliance test runs, and parallel execution to ensure current capabilities still work

DASD: impact of date field expansion, need more for year 2000 test beds, need more for replicated systems under modification

Archives: that's the point, not current so don't try to make them current

Third Party Software: if they will not commit in writing to a year 2000 solution that will be available in time for you to implement then replace them, the competition will commit

Test Beds: there are none for the year 2000 and if you have any test beds they may not apply

Time: new releases of software and the implementation of modifications to systems is only performed on week-ends, how many week-ends are left and how many week-ends do you want to run in parallel prior to "going live" with the year 2000

When addressing the year 2000, not all systems and platforms are equal in risk or cost

RISK 2000
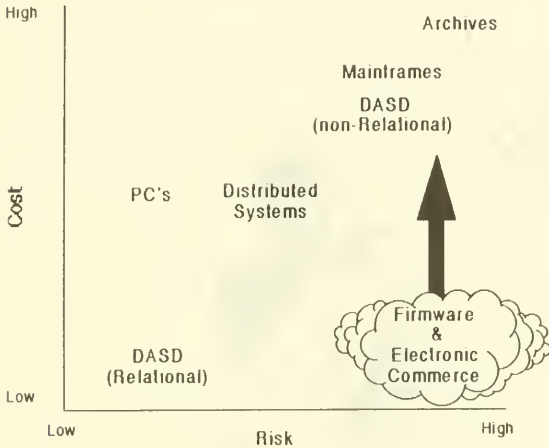
Source   Gartner Group

Key Issue: What is the Year 2000 crisis and what does it mean to me?

Mainframes: high risk, high cost, largest volume of affected systems, what are your new development standards regarding date formats and usage

DASD: high risk, high cost, focus on "legacy" datastores that are not relational in architecture

Archives: very high risk, very high cost, unrealistic to migrate, put in place data access and data warehousing strategies to address year 2000

Distributed Systems: moderate risk, moderate cost, if systems were downsized then the Y2K virus was passed to the new environment, if net new and based on relational data then lower risk, very limited tool support for the identification, location, and correction of date functions

PC's: low risk, moderate cost, if newly developed and based on relational databases, these systems tend to be replaced more often and therefore should include new development standards regarding date formats and usage, high risk if integrated with mainframe, beware of macros that perform date functions (whose standard was used?), limited tool support

The year 2000 initiative will be the largest project ever undertaken by the IT organization.
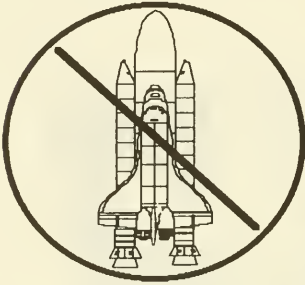
Source Gartner Group

Key Issue: What is the Year 2000 crisis and what does it mean to me?

The year 2000 is NOT rocket science, but it is the largest project ever to be undertaken by the IT organization. The complexity of the project is not in the solutions but rather in the size and scope of the project itself. This means the year 2000 requires "world-class" project management. To put this into perspective, an average large project will cost up to $2 million. Most projects range from $250,000 to $500,000 and are completed in 12-18 months.

The year 2000 will result in 40% - 80% of all code being modified. Depending on the solution it could mean that data will be migrated to a new architecture. The project will take approximately 3 years to complete requiring interfaces and bridging solutions to keep modified and non-modified systems operational making the project exponentially more difficult. An average application of 8000 programs and 12 million lines of code will cost $13.2 million, almost 7 times the average largest project ever undertaken.

This is a bet the company initiative and internal project management skills are not prepared to take on a project of this size and scope.

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The cost of the year 2000 will increase after 1996 at 20-50% per year while the skills to address the crisis will diminish due to supply and demand (0.7 probability).

TIME 2000

External Service Providers (ESP)

Cost

Cost & Staffing Resources — High / Low

Time — 1995 1996 1997 1998 1999
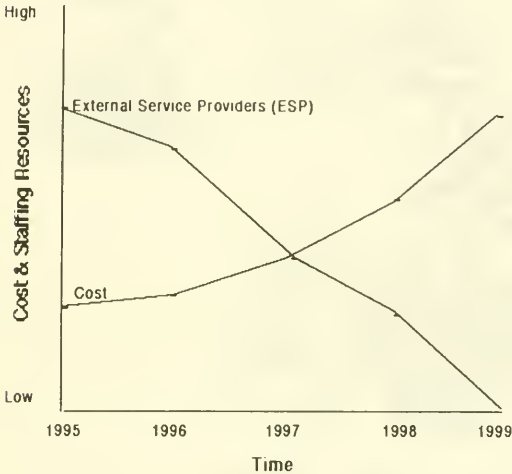
Source Gartner Group

Key Issue: What is the Year 2000 crisis and what does it mean to me?

In 1995 the cost of year 2000 projects was approximately 20% less than 1996 to attract clients and establish a reference base. In 1997 the price will be 50% higher than 1996. The start of 1998 will see many governments (federal, state/provincial, and local) finally get funding and get started, the price will be over 2 times the cost of starting today. At the start of 1999, when it is probably too late, there will still be projects and companies entering the market, the cost will be 3 times the cost of starting today! Estimates are based on many criteria including: platform, infrastructure, language(s), databases and estimates must be refined in the process.

Staffing resources starts at 70% of all full time equivalents (FTE) globally. The best service providers and the best project managers will be fully under contract by the start of 1997. Due to a limited number of available local FTE's, offshore alternatives, i.e., India or Hungary, will provide the majority of FTE's from 1997 and beyond. While these offshore providers currently provide services at 40% the cost of local FTE's, this difference will disappear in regards to year 2000 projects and at best the cost savings will be 10% by 1998. Note: how will you retain your internal staff when they are being pursued by ESP's?

How does a company get started for the Year 2000?.　　　　Reader Notes

Awareness Meetings

Y2K Newsletter
Groupware
Use the Web

Source   Gartner Group

AWARENESS 2000

Internal awareness: start a Y2K newsletter, use the web, and keep everyone informed of the issues and your progress.

Market: an unprecedented event - You have to do it; You have to do it by a certain date; There are no apparent business drivers...

Management: get the standard answers ready to questions from skeptics, like, how did this happen (it's the result of a 25 year de facto standard). This is an emergency and calls for drastic awareness measures that span the entire company.

Business: they'll pay for the solutions but we must find the business value. Additionally, keep the business community involved to prioritize objectives and to keep the year 2000 initiative afloat.

Technical: vendors of tools and services are coming out of the wood work - beware of latecomers. Once off MVS, the amount of tool support and help fades quickly.

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Strategic Planning Assumption

The Crash of '00

By the end of 1998, due to the difficulty in comprehending
the impact of the year 2000, over $2 billion will be spent on
external "experts" to enable awareness (0 8 probability)

Reader Notes

Staff Meetings and Question & Answer Sessions

Presentations

Source Gartner Group

Key Issue: How does a company get started for the Year 2000?

Do not let internal politics or the lack of immediate sponsorship or business unit support
keep your company from starting a Year 2000 initiative. Many companies will utilize
outside sources to help in the awareness of the year 2000 crisis. This help can be via staff
meetings and questions & answer sessions that include an introduction to the year 2000 and
suggestions on how to proceed.

Additionally, having an outside "expert" come to your company to present to management,
both IT and business, can educate management on the issues and give them a chance to ask
questions (often behind closed doors) prior to getting in front of the rest of the organization.
This can help jump-start the year 2000 at your company.

It is important to include both the believers and the non-believers when you have the
"expert" available. The "expert" can facilitate the debate and bring a broader perspective to
the table in regards to the year 2000 crisis.

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Strategic Planning Assumption

By the end of 1999, less than 70 percent of IT organizations will be year 2000 compliant in mission critical customer focused, external, applications (0.7 probability).

Reader Notes

Source   Gartner Group

Key Issue: How does a company get started for the Year 2000?

The year 2000 is a bet the company crisis, it must have CEO awareness and sponsorship and that sponsorship must be NOW! If the CEO is not involved in a crisis that will threaten the very viability of the company, if left unchecked, then what is the CEO doing?

Without the CEO, Chief Executive Officer, or without the equivalent level of management, e.g. Managing Director, sponsorship it will be at the very least difficult to get all aspects of the company to efficiently and effectively coordinate a comprehensive year 2000 initiative.

The CEO must keynote an internal year 2000, Y2K, "kick-off" seminar that is structured to have representatives from IT and the business units present their support and awareness of this crisis.

Strategic Planning Assumption

By the end of 1997, less than 30 percent of IT organizations
will be year 2000 compliant in mission critical customer
focused, external, applications (0.7 probability)

Source   Gartner Group

Key Issue: How does a company get started for the Year 2000?

Find the business opportunity. By identifying value to the year 2000 initiative you enlist the
pro-active participation of the business units.

One critical business opportunity that is fast disappearing is the opportunity to finish first.
To finish first however means that you must be one of the first to get started. The new
market leaders in their respective industries will be defined by the end of 1997 and they will
be the companies that have year 2000 compliance.

Leverage other technology and infra-structure initiatives, when possible. Note, the year 2000
must be solved. By using the year 2000 as the scope and priority focus these other initiatives
may be leveraged as part of the year 2000 solution, i.e. replacing an in-house application with
a package application. Find these opportunities.

Finishing first means an organization can re-focus attention to competitive systems and to the
introduction of new technologies that will enable those systems.

The following steps are involved in a typical year 2000 compliance project

Year 2000 Project Steps

- Awareness   (1%)
- Inventory (1%)
- Project Scoping (4%)
- Examination, Analysis, and Solution Design (20%)
- Modification (20%)
- Unit Test (25%)
- Integration Test (15%)
- Systems/User Acceptance Test (5%)
- Implementation, Disaster Recovery, Documentation (9%)
- Project Management (adds 25% to overall cost of project)
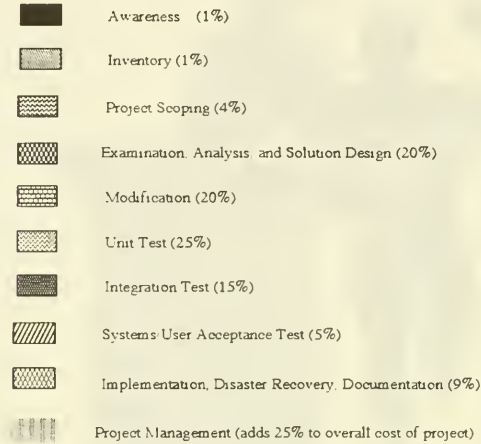
Source Gartner Group

Key Issue· How does a company get started for the Year 2000?

The steps above give an overview of the year 2000 project. Like any large project, the process should be reviewed and thoroughly understood before beginning. Project boundaries should be transitioned as smoothly as possible, and needed resources should be reserved as far in advance as possible.

Information learned in one step should be reused as much as possible to subsequent steps. For example, the information learned in the examination, analysis, and solution design step should be leveraged in the modification and testing steps. This is an ideal time to consider implementing a repository, either populated procedurally as research and modifications proceed, or through a tool that facilitates the population as research and modification are done.

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By the end of 1998, 20 percent of all vendors will not be year 2000 compliant, organizations must have contingency plans to minimize this risk (0 7 probability)

Reader Notes

WARRANTY 2000

What is the solution?

When is solution available?

What does it take to implement?
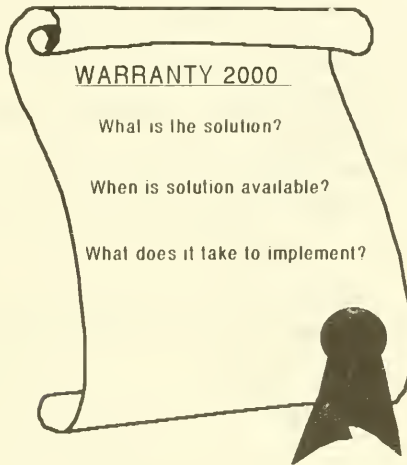
Source Gartner Group

Key Issue: How does a company get started for the Year 2000?

We recommend that user organizations include policy (e.g., questions to ask all vendors when acquiring software or software integration services) and contract language (i.e., compliance definitions and warranty) in all software acquisition. Clients who implement these suggestions when procuring software from mainframe, C/S, desktop or even service vendors will protect their organizations from unnecessary business interruption.

Year 2000 Date Change Warranty: The licenser warrants that the software, which is licensed to licensee hereunder and used by licensee prior to, during or after the calendar year 2000, includes or shall include, at no added cost to licensee, design and performance so the licensee shall not experience software abnormally ending and/or invalid and/or incorrect results from the software in the operation of the business of the licensee. The software design to ensure year 2000 compatibility shall include, but not be limited to, date data century recognition, calculations that accommodate same century and multicentury formulas and date values, and date data interface values that reflect the century.

Until the middle of 1997, organizations will have to rely on "like" references for year 2000 expertise, this is when the first projects will be completed (0 8 probability)

RFP 2000

Services	Tools
1 Methodology	1 Languages
2. Project Management	2. Data Bases
3 Tools	3. Platform & OS
4 Environment Expertise	4. Features & Functions
5. Business Knowledge	5. Known Limitations
6. Metrics	6 Tool Expertise
7 Year 2000 Experience	7 Year 2000 Focus
8. Pricing & Warranty	8. Pricing & Warranty
9 References	9 References

Source   Gartner Group

Key Issue How does a company get started for the Year 2000?

Utilizing an external service provider or the acquisition of a tool does not remove the burden of responsibility and accountability from the IT organization. The result of the selection process should be a partnership, not the "washing of the hands" by IT.

Most of the vendors of services and tools for the year 2000 have reengineering, maintenance, outsourcing or systems integration backgrounds. This is often referred to as "like" skills when relating to year 2000 experience.

RFP's should be structured so as to reflect the phases of the year 2000 project. Beware that if the vendor changes from one phase to the next there is often rework that is needed so as to integrate prior work into the new vendors approach. This takes time and will increase the cost of the project, but is necessary if the new vendor is going to warranty their work.

There are many vendors that will offer services and/or tools to address the Year 2000 date change. It is imperative that the solution is not worse than the problem.

Get Started NOW!

Seek qualified project management

Understand the whole project before diving in

Use tools that leverage knowledge from step to step

Gain long term benefit from this short term problem!

Behind Every Crisis Lies Opportunity!

Source Gartner Group

Mr. HORN. Thank you very much for that very succinct and on-the-mark summary.

The ranking minority member has come in, and I wondered if you had an opening statement. The gentlewoman from New York.

Mrs. MALONEY. I do on this important subject, and may I put it in the record?

Mr. HORN. Without objection, it will be put in the record when the other opening statements were and it will be printed as if read.

[The prepared statement of Hon. Carolyn B. Maloney follows:]

PREPARED STATEMENT OF HON. CAROLYN B. MALONEY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW YORK

Good morning Mr. Chairman. We are here today to hear about converting the government's computers for the Year 2000. That sounds simple enough, but it turns out to be a major management challenge. As we will hear today, if we fail to rise to this challenge the costs will be large. When the ball drops in Times Square on New Years Eve 1999, let's make sure the government has not dropped the ball on the year 2000.

Today we will hear about the potential for disaster in the computer world as we approach the year 2000. It is our job to make sure that the agencies of the Federal Government do not let this disaster happen.

Kevin Schick, our witness from the Gartner Group, estimates that fixing the government computer programs will cost $30 billion. He also predicts that 30 percent of the systems in place today will not be fixed by 2000. Which 30 percent will it be?

Senator Moynihan has predicted that we will have a flat tax by the year 2000. Not because he is a fan of the flat tax, or even that he sees it as a viable political solution. He predicts that we will have to go to a flat tax because the IRS will not be ready to handle the date.

When CEOs and Boards of Directors hear about this problem, they often dismiss it as a technical problem. But it is not. This is a management problem. The task of fixing any one program is simple. The task of seeing that every application in the agency is corrected is massive. To solve it requires leadership from the top of the organization, and strong management at the project level. It cannot be done part time, and it cannot be done on time without the full backing of the agency director.

As the year 2000 draws near the cost of fixing this problem will increase. The fix involves examining every line of code in every system—mainframes, networks, and PCs. For some agencies it involves over a quarter of a billion lines of code. Agencies do not have the staff to address this problem and maintain current level of operations. Those that do not begin to address the problem now, will have to spend significantly more to solve the problem quickly. Social Security started to fix its systems in 1989, and plans to finish by the end of 1998. Many agencies have yet to realize that there is a problem.

The cost of failure is high—systems that deliver services to individuals will not work, and those services will not be delivered. Checks will not arrive on time. Planes will be grounded, and ports will be closed. We learned last year that shutting down the government does not work. We must see that the solutions for this problem are put in place now.

Mr. HORN. Let me ask you a question before yielding for questions from the ranking minority member.

If the computer systems are not prepared in time for the year 2000, who do you expect may be held liable for the damages and what would be the extent of the potential liability? Has that problem been thought out by you or others?

Mr. SCHICK. We looked at that at Gartner Group, and we actually believe, in fact, that 20 percent of the computer systems globally—which also means that 30 percent of the U.S. systems; we are the most automated and computerized country—will be not be year 2000 compliant. The issue is, which 30 percent, and that is the hard question. Hopefully, it is not the 30 percent that touches people or impacts revenue generation and collection.

But when these systems do not operate properly, you will not hear a loud bang. You will not see computers start to run erratically and make strange noises. That won't happen. What will happen, however, is things will look normal; the numbers won't be accurate, and information and decisions will then be made erroneously.

That propagates. It is like throwing a pebble into a lake and it ripples out; you can see the impact of that 30 percent. Those problems could cost the United States another billion dollars. It is very expensive to fix something once it is broken versus making sure that you have resolved the issue prior to.

There is also an organization of people, an industry albeit that is already starting to crop up, that will benefit. Lawyers: Year 2000 litigation lawyers are already starting to establish their services, and they are looking at this as going to be the mother lode, so to speak, for their industry. That is a tragic statement, but it is a very real statement.

It means that money that could have gone into capital improvements, that could have gone into the investments of stockholders, people like you and I, are going to go into litigation. And litigation is very real.

Mr. HORN. You are saying Congress, by action or inaction, is producing another one of its famous "Tort Lawyers Relief Act of"—fill-in the year—"1996."

Now, you mentioned that the Federal Government's information systems, to correct them might cost about $30 billion. How did you arrive at that estimate? I understand that Social Security and others have said that for every code line, it costs a dollar to fix and if we have got 30 billion code lines, it might be $30 million.

Could you explain that so we all can understand it?

Mr. SCHICK. Right. It is always difficult to come up with an estimate of this magnitude, there's many industry standards out there. And we can look at how much an average programmer earns per year, we can look at how much a project manager earns per year; and what we have done at Gartner Group, we have time-lined that out, we have looked at what it cost for awareness.

The fact that you are sitting up there today—think about how much you earn per day, and I understand it is never enough, but how much you earn per day; and then take that for this amount of time we are sitting here. This is the year 2000 awareness. It is a cost of the problem.

Then we need to get an inventory. Then we need to understand how an inventory—which is really just let's go down the programs. How many do we have? What do they look like? Where are they at? Who uses them? It is simple, but it takes money.

You then sit back and you do an analysis. You get down into more detail. That takes time and money and labor. Making the design, let's make sure we do it right. We don't have a lot of time, sir. Therefore, if we don't have time to do it right, we definitely don't have time to do it wrong; so we have to make sure we are right on this one, so we have to design this and we make the modification. Hopefully, we will test it and test it well. This has to work.

Then we have the cost of implementation, the cost of documentation, and over all of this, there is an enormous cost of management—management awareness, management coordination and management synchronization—as we change one aspect of a business, one aspect of an average, and integrate it with unresolved. As you take that out and you roll those numbers up, that is how Gartner Group has determined the $1.10 per line of code; and then we have applied that to roughly 220 billion lines of just COBOL code, which is the most common language in the business community. I then extrapolated that for other languages, looking at platforms; it is an extrapolation.

Mr. HORN. You commence the thought of world class project management to really solve this problem. As I remember, you also said there was a possible worldwide cost of $600 billion.

One, I am curious, what percent of the total world computer operations exist in the United States in both the public and the private sectors; and is there any relation to a value on computer equipment as an estimate of what the cost might be? Or is it simply, some way we have got to find out in particular situations where dates are really involved and put the price tag on that and build the model from that?

How do you suggest, one, the analysis occur of potential cost; and two, how do we mobilize private-public sector cooperation to get at the project management?

Mr. SCHICK. You brought up some important points and let's understand something, let's step back just a second. Let's understand that these initial estimates are really designed to basically grab you by the throat and get your attention. They are big numbers.

Now, does it matter if it's $600 billion or $300 billion globally? We estimate that 50 percent of that $600 billion is a U.S. problem; we are the most prolific software country. We have very high labor rates, so when you look at this problem, you can figure that roughly 60 percent is going to be labor cost. As you look at supply and demand, we estimate that the cost of that labor will go up 20 to 50 percent per year just on supply and demand. The cost won't go down.

As we look at those kinds of numbers, you are very accurate in understanding that that is an up front; we even call it a "guesstimate." It is a rough number; it is looking out there, taking a thumbnail sketch of the problem.

As you go through the process—and this is important—you need to have a process for resolving this. It cannot be resolved in the day-to-day correction of applications. That is unsynchronized and uncoordinated. Therefore, you will fix it at point A; it will still be broken. Add point B. You will fix it differently at point C; and none of these will work together, and you will still have the problem.

As you go through the process, there is a point early on where you actually have to look at your systems and you have to determine, I don't have the problem here, I do have it here; when the fix is here, how does it now work with here?

Today our systems work. They will not work as we go forward. The interesting point is this. Once we get to 2000, forward projecting systems will work. So let's make sure we don't put in a correction that has to be corrected again. And things today that work

that look back in time—the calculation of age really doesn't break until you get to the year 2000, so let's make sure we don't fix that and suddenly have that not work in 2000.

So we have to understand not just where dates are used—that is important because that is location and that tells you when, where, why, how—we need to understand how dates are used. Which agency? What's the function? Who gets hurt if we don't fix it? What's the risk? This becomes a risk issue.

And for many of us who are in business, we look at risk—and we always assess every business decision, what's the risk if I let it break, what's the risk if I fix it, what's the risk—we have got to balance that.

Mr. HORN. Now I yield for questioning to the ranking minority member, Mrs. Maloney of New York.

Mrs. MALONEY. Thank you. As you stated earlier, to fix the Government computer programs, you estimate, will cost $30 billion. And you predict that 30 percent of the systems in place today will not be fixed by 2000; and you made a comment, which 30 percent will it be, and I would like to followup on it.

How are we going to find out which 30 percent is not going to be fixed? Because that is going to cause a tremendous problem, and in anticipation of that, I devised a questionnaire for all the agencies so that—in our oversight capacity, we have done a number of questionnaires jointly in this committee; we can assess exactly where the agencies are and why or how they are moving forward to correct this.

But would you care to speak further about which 30 percent, and how are we going to isolate that 30 percent and start working to address the problem?

Mr. SCHICK. And that is a very, very important question, because if you left it up to technologists, we run out and we find an application that has a lot of dates in it and we get really excited and we fix a lot of dates. And we might actually fix a lot of dates in an application that means nothing. But AT&T had a lot of dates. We are pretty excited. We will come back to Congress and give you the status that we fixed a lot of dates.

You need to categorize your systems in multiple perspectives. Priority systems are those systems—mission critical systems we call them—that touch humans, that touch your constituents. Social Security, it is an excellent example because those are services people need.

Mrs. MALONEY. They say they are correcting their problem. The Social Security Department, they say they have been working on it since 1989 and plan to finish by 1998.

Many agencies don't even realize they have a problem; is that a fair statement?

Mr. SCHICK. This is a very fair statement. It brings up another point that says that the people you are going to hear testify today are not the problem; it is—the people who aren't here today are the problem.

Social Security is doing the right thing. They are part of the 70 percent that will be corrected. That is good news.

The IRS is another level of priority revenue collection; they are part of the solution. They are part of that 70 percent.

But we can identify systems out there that also impact services that are not here. We can identify systems out there today that impact revenue collection that are not here. That is the 30 percent that is at risk.

It takes time to solve this. You can throw all the money you want at this one, but it takes time to solve. If you don't start today, you won't be there; and when that 30 percent fails, it is because you didn't start in time. It won't be because necessarily they didn't want to. You can click your heels three times and not make it to the year 2000 on this one.

Mrs. MALONEY. We had a hearing earlier with the IRS, and one of the things we learned, they are really lagging in their modernization of computer systems. Senator Moynihan has predicted we will have the flat tax by the year 2000, not because he is a fan of the flat tax or even sees it as a viable political solution; he predicts we will have to go to the flat tax because the IRS will not be ready to handle the date.

Do you see that as a possibility?

Mr. SCHICK. Well, I am not running for President, so I am not sure, but here is the interesting perspective of a flat tax coming into this conversation. It is very interesting. What it says is, you are looking at a contingency plan. If you know the ship is going to sink and you know that 30 percent of whomever is on that ship will not make it, which 30 percent, what's your contingency plan, and when will you implement that plan?

If a flat tax can be implemented in today's systems and beat the year 2000, that is a contingency plan. That means, try to be there with the other systems. But, quite frankly, there comes a point when you have to very honestly look at Congress and at the American people and say, we can't do it.

When do you say that, what's the plan? And if it's a flat tax, implement it; it is better to have a tax than no tax.

Mrs. MALONEY. Nearly all the offices that we have have some sort of word processing, either WordPerfect or Microsoft. What will happen with these packages? Will they send out a fix for them or will there be new packages? How will we address that particular problem?

Mr. SCHICK. First, we have to appreciate not all computer systems are created equal. Mainframe is where most of the problems reside in the year 2000. The types of packages you have identified are commercially available off the shelf, and they tend to be more of a client server or personal computer-based system. Those will probably have—Gartner Group likes to say—point A probability; they will be year 2000 compliant.

You also have to understand that one out of every five vendors will be out of business by the year 2000. Is that going to be one of the vendors; and if so—you own WordPerfect, you own Microsoft Word, you own many vendors' software—you have to find out today what is—what is their year 2000 solution and when will it be available and what does it take to implement?

The fact that somebody gives you a solution and it requires you take your entire resource and apply it, and it showed up 2 days before 2000, that is not a good answer. So you have to ask and get answers from your vendors. Not just those vendors—you are pretty

safe in the PC world, pretty safe. Remember, we are talking risk. How much risk are you willing to take on and what happens if a word processor isn't compliant? I don't think someone gets hurt.

Mrs. MALONEY. How would you characterize the level of preparation in State and local governments, and what will happen to those State and local governments that don't do anything and what effect will that have on the rest of us?

Mr. SCHICK. Searching for the right words. How about frustrated, very concerned both as someone who does research of the market and as a citizen when I look out at the States and I look at their own procurement processes, when I look at their own bureaucratic hurdles that they have to clear just to get someone to say, yes, we really have a problem.

For example, what makes any State think that they can set the precedence that they don't have the problem? So where's the justification? What's the issue? Let's get on the bandwagon and let's get moving.

Now, what does it mean if a State or local government, they are waiting for somebody to ride in on a white horse and save them? Horses trample flowers and they leave a mess behind, and that is exactly what's going to happen with some of these States and local governments.

Also, we have to recall here, this is our first legal virus. We had the right to do it and we did the right thing at the right time, but it is a virus. That means for every State and local government that does not eradicate this virus and they send you information, they send you their taxes, they send you their census, it will be wrong. And you will now have your computer systems corrupted and infected.

Mr. HORN. I now yield 5 minutes to the gentleman from Virginia, Mr. Davis, for the purpose of questioning.

Mr. DAVIS. This is very intriguing. We were speculating on some of the consequences. Mr. Flanagan is not here, but in Chicago for the first time some dead voters have turned out at the polls; because they are not old enough to vote, some women who get their wish to be young again are in fact going to be young again; and poor Strom Thurmond, we were wondering what this would do to him. He'll be protecting the rights of the unborn when he comes up in the year 2000.

Can you talk a little bit about what the commercial sector is doing in terms of new software coming on and what the private sector is doing about this? I think, as usual, they are leading the way in this, and Government is kind of realizing oh, my goodness, we have a time line we are coming up against.

Mr. SCHICK. I am from Chicago, Congressman, so I appreciate your stories.

Vote early, vote often is the not——

Mr. DAVIS. When I die, I ask to be buried in Chicago so I can stay active in politics.

Mr. SCHICK. I will vote for you several times.

Mr. HORN. 1963 was known as Resurrection Day in Chicago when 300,000 of the dead voted.

Mr. DAVIS. The year 2000 will be Resurrection Day across this country, it looks like.

Mr. SCHICK. To answer your question, let's first understand that Government is behind the curve; they are already late. That is an important message.

You are not significantly later than private industry. That is also the message, and that is what I hope would come out of these hearings to wake up a lot of people.

The commercial industry, providing commercially available, off-the-shelf software, is very quiet about this issue. They are looking at their own systems to figure out, how can they provide the answer. We do have vendors that are publishing when their software will be year 2000 compliant. There are many vendors not publishing that information and, quite frankly, I would suspect have no intention of making their software year 2000 compliant. It is expensive and they would just as soon lose you as a customer or sell you another copy of something else.

So there are going to be some very interesting shifts in the marketplace as a result of the year 2000.

Mr. DAVIS. Consumers ought to be asking, when they buy software at this point, what's happening? Is this going to take me through 2000, or it is going to expire and create more problems?

Mr. SCHICK. Consumers should ask, and they do, and vendors give the answer the consumer wants to hear. In the absence of having any kind of legislation that says, you have to be honest in business, then business oftentimes has the opportunity to be less than candid or less than honest. And, in fact, in our industry let's also not lose sight that we are inherently and traditionally and historically late on everything. We never deliver on time when we say we will, we always go over budget. And unfortunately, we are now faced with a project that must meet its due date or there is failure; and that is faced by the Government, by the private sector and by the commercial vendors.

Mr. DAVIS. You are spending all this time and effort on something everyone assumes that is there to begin with; you are giving no value added, really, for all this effort. And the difficulty the Government is going to have and the Congress is going to have are something people never realized was broken; they can't imagine why you would spend resources, let alone the amount you say you needed to take care of the problem.

Mr. SCHICK. You are using a word I am flinching on a little bit, and that would be "broken." We have here a 25-year standard. I was very proudly part of the ground support systems on the Space Shuttle. I was part of the ground support systems on the F–16 project, and I know we use two-digit dates on those systems. They were the standard. It was how the technology was implemented at the time.

I am also here to tell you that I never dreamed those systems would still be running today. The value we have gotten from our infrastructure, the time those systems have survived and served us well should be applauded; we have gotten our dollar's worth. As in any infrastructure issue, be it bridges, highways, or computer systems, there comes a point where the infrastructure starts to collapse, the standard changes, and you have to invest in it. The counter side to this is, they don't get their services.

Mr. DAVIS. The real problem is, there is no silver bullet to this because you have so many different CIS systems and languages that don't talk to each other; that is the problem. To do this in a thorough manner, programmers, software engineers, we would have to go down every line of code and check and see; "000" would move back and forth with unintended consequences, isn't that the problem, to do it thoroughly?

Mr. SCHICK. You have hit it on the head. There is no silver bullet to answer back to the issue of State and local governments. I hear this every day.

Someone will solve this problem, and we will buy this solution. But we all do things differently. Interest on your money in any given bank is computed differently from bank to bank; how an insurance company computes your premium is different from which product did you buy. So we are very much a business-ruled free enterprise, commercially driven society; that means it is up to you how you want to compute something and utilize dates and, therefore, that is your competitive advantage. You are right, many languages, many platforms, 20-plus years of implementation is no silver bullet.

Mr. DAVIS. Thank you.

Mr. HORN. Thank you very much. I now yield time to Mr. Peterson for questioning.

Mr. PETERSON. Thank you, Mr. Chairman.

I am curious about how this basically is the biggest problem with the mainframe systems which were developed a long time ago. How did all these brilliant people make such a stupid mistake when they initially got into this situation?

I haven't studied it all that much, but it seems to me they decided they could just use two areas of code, instead of four, and that is what caused this problem.

Mr. SCHICK. Yes, sir.

Mr. PETERSON. How could all these people miss this?

Mr. SCHICK. Now, remember I was one of those.

Mr. PETERSON. Couldn't they understand this problem was going to happen?

Mr. SCHICK. Remember, I was one of those people.

Boy, I am never moving to Minnesota.

Mr. PETERSON. I was involved and bought one of the first mainframe computers to do bank processing back in the 1960's, back when—we were pioneers in those days. I still cannot—people must have realized that this was going to cause a problem. Why didn't somebody think about that?

Mr. SCHICK. You have used a very operative word here, pioneers. In fact, in the 1960's in the pioneering days of computers, we actually used cards. On cards, we put a single digit on.

One of my first projects I was ever on was to convert from '69 to '70 to get ready for the decade. Why did that happen? We never dreamed those card systems would have been around that long. So we went to a two-digit. We had the opportunity then to go to a four-digit, and we looked at it and we did an assessment, and we determined that the cost to go to a four-digit date in that current technology was going to be more than the cost of using two digits and then replacing those systems at some point in the future.

That point has happened. Those systems lasted longer than we thought, but we made a decision, a conscious decision. What ultimately came up, Congressman, is as we upgraded our computer systems from the '70's to the '80's, we didn't convert our data. That would have been an extra cost. And the business people said, "I want new functionality. I don't want four-digit dates."

Mr. PETERSON. Isn't part of it being driven by the fact that the mainframe community was trying to keep their systems from going to the PC-based system? When I was in State government, we had a hell of a time with the people in our State buying antiquated mainframes when they should not have been doing that, and spending tons of money; and a lot of it seemed to be driven by the different companies trying to keep the technology from expending.

The little bit I have looked at this, I just wonder if the net effect of this is maybe not going to be to shift some of this business finally from the mainframe mini environment to the PC environment. Isn't that what's going to have to happen if people took a look at this?

Mr. SCHICK. In your business decision, you need to determine which system it is going to be—PC-based, go to client server, get off the mainframe. Let's not lose sight here, we are in a ship that has a hole; that hole is called the year 2000. What you are suggesting is, let's build a new mast for the ship.

Mr. PETERSON. I have done some study on the problem as it relates to PCs.

Apparently, there is—I just got an e-mail the other day; there is some kind of program you can put on your PC that will fix the problem—I forget what it's called—I got it free from some guy who e-mailed me. Apparently, there was some other of their PC; there are problems in the ROM files that is built into the BIOS where you actually need some kind of a fix from the hardware person or something, and so that is not necessarily the solution.

It looks to me like there are problems within the PC community as well, but they are probably more fixable and you don't have to rewrite all this code. That is the big problem with the mainframes, you have all these thousands and hundreds of thousands of lines of code in the program; is that not the case?

Mr. SCHICK. You have described it very accurately. We have to remember, not all systems are created equal.

Now, the Government is currently running on a mainframe. You go buy a PC and you set it down on a desk and you plug it in and you sit there and you wait for the Government systems to come up and flash up on the screen of the PC. It doesn't happen.

Do you know why? They are not written for the PC, so now you have to take on the risk of migrating your systems from a mainframe to a PC. That is going to be the right thing to do in certain scenarios; it is going to be the wrong thing to do in other scenarios because of the risk.

Migration projects are very high in risk. They fail very often, and failure is defined by four criteria. One is, it goes over budget, so we will just throw more money at it; two, it misses the time—you cannot miss the year 2000; three, oops, if I didn't deliver all the functionality, then I am not doing things I was supposed to do; or four, the whole thing comes down on you, it just doesn't work.

We have to be very careful of immediately leaping to any one solution. And, in fact, don't start with a solution; start with an understanding. Do an assessment of your systems so you are smarter today than you were yesterday.

They were very bright people that implemented these systems. Again, these systems have been running our world for 20-plus years. That is pretty smart.

Mr. HORN. Thank you very much. I now yield 5 minutes for questioning to the gentleman from Massachusetts, Mr. Blute.

Mr. BLUTE. Thank you very much, Mr. Chairman. I want to commend you for holding these hearings and bringing this very important issue—I think it is an economic issue for the entire country—to the attention of more people who, I don't think, are really knowledgeable about the implications of what we are talking about; and I think this hearing will lead us to begin to talk about the implications in a more serious way.

On the one hand, it is a very, very serious issue, of course; on the other hand, it has some humorous aspects to it, I think. I think—if we are going to have background music here today, I think we should have Prince's "1999" on, singing that we should be partying like it is 1999. I think by the time we reach 1999, we may not feel like partying if we can't avert some of the negative aspects of what we are talking about here today.

Today I am very interested in the impact on our national defense. I got here a little late; you may have covered some of that.

How significant is this for our national defense infrastructure? We clearly are computer oriented now, and that is one of the reasons we have become the most powerful and effective military in the world. We saw that in the Gulf war. How does this impact our capability and how much it will cost to fix just at the Department of Defense?

Mr. SCHICK. I think we would have to refer to that music as the performer who used to be known as Prince.

Mr. BLUTE. You smartened up, corrected it before 1999.

Mr. SCHICK. The Department of Defense has got a very large challenge in front of them. They have issues in software, which is something that is easier to understand because, as the other Congressman from Minnesota highlighted, we can almost even go back to who did that to us and look at the code and find those dates.

Within our weapons system we have chips. I am not here to tell you that those chips will not work correctly in the year 2000. What I am here to tell you is, we don't know if those chips will work correctly in the year 2000. That is the bigger issue. We are looking for knowledge here.

Mr. BLUTE. These chips would be in what infrastructure?

Mr. SCHICK. What these chips will do is, they will report back to us time-to-maintenance failure, for example, so they keep track of the different parts, the different mechanisms and systems within, let's say, a fighter, an F–16. And they keep track of the parts within an F–16 and they keep track of failure times; then they give that information back to our mainframe and distributed systems, which then reconciles that across our services. And that is what we base our readiness on. So—it is from these kinds of systems.

So what happens when you compute time to failure? Are you using duration, which just counts the number of days and minutes and seconds? There is not a problem in a system that does that. If you are computing that I had my maintenance done on this date and therefore the failure date is this date, that does have a problem.

Now let's not lose sight, that problem I have only lasts for a certain window of time when you go from 1999 to 2000. So what we are describing here is a window of risk. It is within that window of risk that we have to assess, what could be the benefit, or the damage benefit, of resolving it, or the damage if something actually goes wrong during that timeframe?

So it is again determining the window of risk, not necessarily that they don't handle the date.

Mr. BLUTE. I think that you are very wisely suggesting a prioritization of dealing with these issues, that the questions concerning our national defense be put right at the top of our priority list, particularly in those areas, as you mentioned, F–16 pilots not knowing whether the maintenance is up to date is a very serious issue in my opinion.

The other question I had is, what impact will this have on the home computer, the personal computer, where we have millions and millions of Americans who now do a lot of their computing, a lot of their recordkeeping in their home computers? What is the impact for them and how will we potentially solve the problem for consumers out there?

Mr. SCHICK. Well, my computer at home was bought about 18 months ago, and it is a 486. So it is a pretty high-powered computer. It does not handle the year 2000. I have tested it at home. The ramification on my home systems could be a scenario such as follows.

I have a home scheduling system that I maintain within a data base. It keeps my life, my records; everything is in there. When a particular record reaches a certain age, I back it off to a disk; then I delete it out of my system, and I have to keep track of when to back it off because automatically this data base comes up and says, do you want me to delete records that are, how old, 6 months old?

When my system hits '00—and it used to be '99; it now thinks the records are 99 years old. When it asks me that little magic question Saturday morning—and I am sure the condition I will be in when it asks that question—and I just automatically reach up and say, yes, delete those records, it is going to sound like a tommy gun going off as my entire data base gets erased.

That doesn't mean much to Congress, that doesn't mean much to the computer manufacturer. My life has suddenly been deleted off my computer, and that is given that I have gone away from the paper of tracking things——

Mr. BLUTE. Devastating.

Mr. SCHICK. I am devastated.

That is a very real thing for people. What do we do to fix that? Given most of us buy our computers and never really upgrade, then we are captive. Is it going to be a $40 fix? OK, I can afford $40; my brother can't. Is it going to be a $200 fix? Now I start getting a little worried.

Do I have to open up that computer to fix it? It is better to let it break. I will never get it back together; if I do, there will be parts left over and I can sell them back to the computer company. That is the personal side of this issue.

If we also look then at how we use our home computers to improve U.S. productivity by 10, 20, 30 percent because I take work home, now what happens?

Mr. BLUTE. Which is an increasing trend now.

Mr. SCHICK. Increasing. Increasing to the point that this is what a lot of companies are going to base their cost savings on is that you work at home. They don't have to maintain a facility, they get more productivity; it goes to the bottom line, it makes us who we are.

My computer is not compliant for the year 2000. I do work on that computer, I create infected information. I put that on a diskette or electronically I send it to my company over a network, the Internet, for example, may end up being the worst thing that happens to us with the year 2000. I can now touch anybody with an infected piece of information.

They receive that information and they look at it and say, has Kevin sent us any dates that are in the wrong format? No, Kevin didn't send a single date. He sent the result of date-based functions. They don't know that. They have to trust me. I have never sent a bad thing before.

Now they have taken in information that they can't even use a virus checker for. Remember, this is a legal virus. There is not even a date in the information I sent, so they couldn't even look at this thing and say oh, boy, if there was a date there, we should check it. I sent just the results. They take those results, they put them into their systems. The answers are not wrong.

We have infected America. We have infected our business computer community. We have infected our Government.

I sent you my tax returns electronically. OK, I am at fault. I was told that yesterday by the IRS. If I compute incorrectly because of the year 2000, I am at fault.

Mr. BLUTE. If 5 million people do it, they may be at fault, but the IRS has a serious problem on their hands.

Mr. SCHICK. The answer from the IRS is, I am at fault. You said it very well, Congressman. We can find who is at fault. The results are wrong revenue collection, services not provided. I don't care who is at fault. Let's fix it.

Mr. BLUTE. Thank you, Mr. Chairman.

Mr. HORN. Thank you.

I now yield 5 minutes for questioning to the gentleman from New Hampshire, Mr. Bass.

Mr. BASS. Thank you, Mr. Chairman, and I would like to commend you for holding these hearings. This is a very timely subject, obviously. This is an extraordinarily complex problem and, as you mentioned in response to my colleague from Massachusetts' question, very serious indeed.

And as one who went to Dartmouth College, which is one of, I believe, the leaders in the development of computer technology and language software, I am surprised that this issue has not been on the forefront until recently.

I was wondering if you could give me, if you haven't already done so, your testimony, a little thumbnail mystery of the debate on this issue and when it began and, if it hasn't begun until recently, why has it not.

Mr. SCHICK. I would like to commend the State of New Hampshire. Gartner Group does a lot of work with the State of New Hampshire, and you are very active in resolving this, and I applaud you. I did my first year 2000 presentation in 1988; I did my second one in 1995. On the slide, in 1988 I had handwritten a note, "Take this slide out. Everybody will be in client serve by 1995." We missed it by just a little bit.

Mr. BASS. Just a little bit is putting it mildly.

Mr. SCHICK. It has been out there a long time. The 30-year mortgages work. That means they solved that problem in 1970. By the way, those same mortgage companies solved it. Now they are looking at all these solutions they put in place, and they don't play together. The way we change mortgages and refinance daily, it is imperative we find a solution.

Mr. BASS. It just surprises me there isn't a record of this discussion in the '50's or '60's, as computer pioneers developed programs, that they didn't forecast that this would happen and express some concern about it then.

Mr. SCHICK. We have always been aware of the four-digit issue with dates. There has never been a belief that that which we implemented in the sixties, that which we implemented in the seventies, that which we implemented in the eighties was still going to be here when "00" arrived. It just was not part of the model. These systems were only going to be around and many cost benefit justification programs—they were only going to be around maybe 10 years. If we got 10 years life out of them, they paid for themselves and then some. We got that life; they paid for themselves; now it is time for us to pay to them.

Mr. BASS. Can you give me some idea as to what the level of discussion or preparation is in other countries besides the United States?

Mr. SCHICK. Japan: I have talked to one company in Japan, that is a vendor, that is doing something. This vendor expressed real concern for these meetings. They hoped that the U.S. Congress would come out with a very strong statement because the Japanese Government and the Japanese commercial industry and private industry hangs on the words of the U.S. Government. If Congress says there is a problem, there is a problem. If Congress does not say there is not a problem, then they will not resolve this.

Europe: Europe believes that the United States will blaze the trail, we will find the solution, they will take that solution and apply it to their systems. They are naive. It is not a silver bullet. Every company is different. The way you implement business is different. That applies whether you are within our borders or outside of our borders.

Therefore, they hope they can find a business partner here in the United States that solves it, and in countries beyond that, when you look at the Third World countries, their best hope is that they implement technology new and they'd better make sure, when they

acquire that technology, they have asked the magic question: Is this year 2000 compliant?

Mr. BASS. Can Congress do more than just make a statement that there is a problem?

Mr. SCHICK. When I deal with businesses, I would love to have Congress pass a law that says, one, they have to be honest and tell me about it. So when I go to my investment company and say, Are you guys year 2000 compliant because this is every penny? If they tell me, don't worry about it, and pat me on the head and send me out the room, I would like to know Congress—I don't want you to have any law that messed with me.

How could I reconcile that? How do I say make business honest and leave me alone? Can you actually pass legislation that says you have to be year 2000 compliant? Is that even defensible in court? This gets to be a very strange question.

And if we went down that route, how long would we be debating this thing rather than solving the problem? I would rather see Congress able to put out something that says this is what year 2000 compliancy looks like. It has to be able to work in a multiyear scenario. The systems have to be able to function before, during, and after 2000 arrives, not that it has to be a four-digit date, not that you have to use certain edits, leave that up to me, but somewhere make some sort of stipulation if that is the best we can do or pass some sort of legislation that does say you have to be compliant and compliancy is, it has to work, not what it looks like but that it is the how. It will work.

Mr. BASS. Thank you very much, Mr. Schick. And thank you very much, Mr. Chairman.

Mr. HORN. Thank you very much.

I am fascinated that the Japanese Government or someone in Japan hangs on the words of Congress, because if they are going to do it, I would like to first talk about trade. We will get back to computers.

One of the things we have in America is a belief, in the majority, certainly that Government does not have to do everything, folks. And I come out of the university background. We have self-accreditation of outside teams that come in and tell us that what we are doing is right, wrong, or stupid. Let's apply that same analogy to this area. Should a group that has done a lot of work in this area and is highly respected, such as the Information Technology Association of America, look at these programs that are claiming to solve the problem and give what we used to know as the Good Housekeeping seal of approval? What's your thinking on that?

Mr. SCHICK. I think that is a good thing. I hesitate to say that that will be effective. I have appliances at home that have a UL seal on them. They still short out. So I am not sure that any industry group really carries the clout.

We also have to appreciate the magnitude of this issue. Does the ITAA even have the resources to establish real compliancy company by company, vendor by vendor?

And if a vendor is considered compliant today, how do we put in a continuation system, a continuation program that makes sure that whatever they release next time is compliant? It becomes a very, very difficult task to watchdog something of this nature just

given the nature of the scope and magnitude of the problem. I would applaud any organization for doing so. I would be hesitant to say that is going to be the answer.

Mr. HORN. One last question on my part, and I see we have two colleagues arrived.

Governor Wilson of California recently created a cabinet department that has the responsibility for information technology and brought in a first-rate person to head it from Massachusetts. Congress created the Chief Information Officers Act in which Federal agencies are now mandated to have a Chief Information Officer.

In your role as a consultant, do you see other States doing what California and some other States have done? Where are we in that area? We intend to do a survey after this hearing. I was curious if you had some knowledge and experience on that.

Mr. SCHICK. There are a number of States that are very active in the year 2000. The CIO initiative is one of the best initiatives that could be put forth. It ultimately says that within our programming structure there is now someone we can hold accountable for and they are responsible for this. That is a critical step, accountability and responsibility, and then having the mandate and the empowerment to do something.

There are several States that are implementing CIO's that have no budget. Who cares? This is the whole point. If you are going to put in a program like this, that program has to be empowered.

California is very, very progressive on technology. The CIO has the power and will be able to carry out a statewide coordinated function on this. They have awoke even to the fact that if they left it up to each agency, each agency may or may not solve it, and then worse, if they did solve it, will they even be able to run as a State? Will the solutions even work together?

So in addition to a CIO who is that person who sponsors the project, the Governors, the Congress also need part of that sponsorship, then have to make sure everybody comes together in a single project office and presents their resolution and that gets reconciled.

So these are good steps, but we have to follow a process, and it could be that by helping States recognize a CIO structure, encouraging the funding, and empowerment is given to that structure identifying the year 2000 as a priority one, and then giving a process as a framework so that everybody doesn't have to reinvent the wheel here, then I think you have done something very proactive.

I do see States that are taking the measures here, but I must be very, very honest with you, sir; it is not the majority of States.

Mr. HORN. Just to round this out on the Federal Government side, obviously one purpose of this is sharing to assess where we are department by department, where is the Office of Management and Budget on this?

Let's just go through a litany for a minute, so we are all clear and using the same book.

We are in fiscal year 1996. That ends on September 30. The President has sent up a budget which we are now beginning to process for fiscal year 1997 which ends September 30, 1997.

Recently the Office of Management and Budget is sending out to the agencies requests around fiscal year 1998. In that request

package, I understand, they have been raising this year 2000 problem.

Now fiscal year 1998 starts October 1, 1997, and runs to September 30, 1998. If we are waiting that long, I think that is a little long to wait, because you have the problem of scarce human resources that are going to get tighter and tighter as you near the year 2000, besides the fact that Government always underestimates the time it takes to do a job and always underestimates the funding it takes to do a job.

So having that sort of in my mind, do you have any words of wisdom on the OMB situation, before I have Mr. Tate ask the last questions?

Mr. SCHICK. The process and the timeline you just laid out severely lacks a sense of urgency. When you look at the year 2000, that is a key component.

Gartner Group and myself, we are not interested in sensationalism, so we are very cautious about creating a sensational story here about the year 2000. We don't want panic. That does nobody any good, because one of the downsides of panic is, people can freeze, and it is basically, well, it is going to hit; me hit me; I will hire the best lawyers, and your lawyer can talk to my lawyer.

You will not be successful by piecemealing this project between now and when the budget comes into effect. And just because a budget starts October 1997, what it takes to mobilize once funding has been received is yet another issue. If we are not already well into this project by October 1997, you will be guilty of a disservice to the very constituents that depend on you to prevent something like this from happening to them, and I don't mean to be disrespectful, but there is no sense of urgency in that timeline.

Mr. HORN. That is the administration's timeline I was citing. One of the recommendations of this committee is to create a separate office of management, reporting directly to the President to get to budget issues and deal with management problems. That is a management problem. Too often it gets swept under the table because of worrying about money.

We also have to worry about structures, programs, benchmarks, and are we on the right track, and will we make it in time?

I yield 5 minutes to the gentleman from Washington, Mr. Tate.

Mr. TATE. Thank you, Mr. Chairman.

I have a couple of quick questions, and I didn't get the chance to hear your entire testimony. I have been reading through it.

What resources exist in the marketplace today currently that could address the 2000 problem?

Mr. SCHICK. There is a number of pools of resources that are available to us. One, there is automation, so there are tools out there.

But, you know, a hammer is just a hammer, and it doesn't build houses. So there are tools available, and they do a pretty good job, but they are very limited typically in their scope, and they are limited in the particular phase of the process they can address. But it is an important component of the solution.

Then we look at really three labor pools: an in-house labor pool, an external labor pool, and then a specialty labor pool that will provide you such skills such as project management, because this will

require world-class project management for the coordination and insuring synchronization of solution as you go from one phase to the next.

Externally, those resources will be gobbled up by private industry because they can pay top dollar, and therefore the Government which continues to use GSA schedules that require the lowest bid will be faced with going after skills and resources that are less than what the private sector will get, and in fact if we looked back at your timeline and based on a 20- to 50-percent cost increase per year on this project, you will pay almost double for a person who has basically 13 skills, if you looked at a ball team. So you are going to pay the all-star rate to the practice team. This person doesn't even get on the travel squad. That is who you are going to get.

My brother is in construction, and I have strongly encouraged him to get into this business.

Mr. TATE. Have your software providers and systems integrators been responding to this issue?

Mr. SCHICK. The software providers and system integrators are very, very proactive on this. You don't see advertising for it, because what they do is go into their existing client base and they come back and say, You have this problem. We are already a customer and a client relationship. Let's go Ford. And why go out there and spend the dollars on sales and marketing when, if you don't have to spend those dollars, that goes right to the bottom line?

Right now in the hallway, vendors are high-fiving each other. They are so exciting, they are dancing. It finally happened; the mother lode has come home. They have to come to us. I don't even have to ask you if you don't have a problem. If you don't have a problem, get out of line. Just get out of line. There is a person right behind you with their checkbook already out.

That is what is happening in the market. That is the risk you will run in the Government the longer you wait and the more you depend on your internal staff to solve this problem.

Now remember, we are going to run out of the available resources. Where do you go look? You go to the people who are currently in house, and you say things like, How much money do you make working for the IRS? Show me your W–2 form, and I will pay you $15,000 more, sight unseen.

They hold a little mirror underneath your nose to see if you can create any kind of a mist. Then they bill you out at $100,000 a year.

You will not have the resources to solve this problem. You will not be able to afford those resources come 1998. They will be under contract anyway, and your own people will see a career opportunity to go work for more money, better benefits; life is good.

Mr. TATE. Mr. Chairman, I yield back the balance of my time. Thank you for your testimony.

Mr. HORN. I thank you very much, and I thank you, Mr. Schick. You are an example of a very good witness. You communicated very well, and we should just invite you back in general. You might become our ubiquitous witness.

Thank you, Mr. Schick.

Panel two, if you will come forward.

If you will stand and raise your right hand, those that are going to testify.

[Witnesses sworn.]

We will proceed in the order in which you are listed on the hearing program. The first presentation will be by Mr. Louis Marcoccia, director of data administration and logistics, of New York City Transit Authority.

Good morning. How are you?

STATEMENTS OF LOUIS J. MARCOCCIA, DIRECTOR OF DATA ADMINISTRATION AND LOGISTICS, NEW YORK CITY TRANSIT AUTHORITY; NICHOLAS J. MAGRI, SENIOR VICE PRESIDENT, SECURITIES INDUSTRY AUTOMATION CORP.; AND MICHAEL B. TIERNAN, THE FIRST BOSTON CORP., ON BEHALF OF THE SECURITIES INDUSTRY ASSOCIATION, DATA MANAGEMENT DIVISION

Mr. MARCOCCIA. Good morning. How are you doing?

I would like to, first of all, start with a statement on my background.

I have been the year 2000 project manager since 1993. Before that, I managed a 3-year redevelopment infrastructure repair project that was successful, and I volunteered to be the year 2000 project manager, and since then we have analyzed all our systems and in a pilot situation now for the last couple of years I have been speaking at seminars throughout the United States. I will be going to South Africa for a year 2000 conference in June. I will be going to London in September, and I also hold a 1-day year 2000 class.

I think I would like to focus on two things: One, why we haven't moved forward with the year 2000. I think there is real reason why and really has to do with, one, it is not a glorious job.

The Vice President of the United States talks about Internet, why it is a 30-second sound bite. It is glitzy; it sounds good; it is the future. No one wants to be the project manager of a year 2000. It is dirty; it is the army; it is grunt. That is a major reason.

In these seminars, I have spoken to hundreds and hundreds of companies and people, and I have met maybe 25 so-called project managers within a year period. About 80 percent of those project managers change hands, and most of them change hands because they ran away from the project. There's very few people who are project managers now who were project managers 2 years ago or a year ago.

For the organizations that have been identified project managers, senior management, this is no return on investment. Clearly, it is not. This is bad news. And the one reason that I volunteered to be the year 2000 project manager is because I just came off a 3-year very tough infrastructure project. If I didn't do that, I would not have volunteered to be the year 2000 project manager at my shop because it is dirty, not glamorous. It is like picking up the garbage. No one will notice you unless the garbage doesn't get picked up. That is why it is not happening.

Senior management really, I think, are looking at the natural average of CIOs changing positions 18 months to 2 years. I will prob-

ably have two more CIOs by the year 2000. Why should I bring up the problem now?

I think when you combine those issues, that is the core of the issue nonglitzy, infrastructure work, dirty stuff, and people believe you just put the old on the project.

I would also like to tell you that I also teach at Houser University client server, and I also implemented Oracle data bases.

The reason I mention that is, I chose to be the year 2000 project manager because I enjoy project management activities, and it is not because there is no other thing to do.

I think there are also issues we did at the Transit Authority back in 1994. We did several things. We established a standard of dates. All dates on new programs would be extended by 2 years. We—on all our legal matters right now, we are going to some RP processes. In those processes we include the outsourcing functions of any organization, any vendor that handles our work, to handle that issue.

We have really set up the program into two distinction phases. One phase was to analyze the problem that we had and to decide how much resources we needed. Phase two was the execution of that.

We have completed the analysis of our applications. We basically have three categories of applications. Category one are those applications that will not retire, not be replaced, that must be changed by the year 2000. And we have a coarse figure for that. Category two, those applications that we currently have initiative that, if implemented on time, those systems will not have to be year 2000 compliant, and we have a list of those applications. And, by the way, we do have five applications that we designated as being year 2000 compliant.

[The prepared statement of Mr. Marcoccia follows:]

To.   Government Reform and Oversight Subcommittee

From   Louis J Marcoccia

Subject. Year 2000

WHAT IS THE PROBLEM FOR INDUSTRY:

The year 2000 is an event that will impact a large percentage of existing software. Most of the existing software has the year represented as a two character field (i e 1996=96) This will cause a problem for all dates that start in the year 2000 For example, the year 1999 is stored as 99 and the year 2000 will be stored as 00 Any comparisons between the two dates will cause inaccuracies within the existing systems.

The year 2000 date change is one of the most significant changes ever faced by the Information Technology Industry, and will have an enormous impact on business applications, package solutions, and systems software, even putting some companies out of business It is estimated that companies in the United States will spend in excess of $25 billion addressing the software changes required by the coming millennium. Also be aware that this problem also effects elevators, test equipment, personal computers, and pre-packaged software.

WHAT IS THE IMPACT IF NOT ADDRESSED:

SUMMARY

The following information discuss detail the business impacts on organizations if the year 2000 compliance project is not done. The bottom line is the companies will not be able to conduct business as usual. Paychecks both for current employees and retired employees will be incorrect. Maintenance and manpower scheduling will be done based on guess work rather than what is required. Accounting reports will be inaccurate. The procurement process will be much harder to track and take much longer. Payments to vendors will be delayed Determining what material is needed and what storeroom it should be stored at will just be an educated guess Legal requirements from outside organizations will go unsatisfied. These are just a partial list of the impact of not doing the year 2000 compliance project.

Accounts Receivable
Aging of Accounts Receivable will be inaccurate. This will mean the process for determining Accounts Receivable will be slower, more cumbersome, error prone, and more subject to fraud. This will result in losing money.

General Ledger
Accounting will not be able to make accurate prior year adjustments and future period postings The books will be inaccurate, unreliable, and more subject to fraud.

Planning & Budget

OMB will not be able to prepare the new operating budgets on an automated basis. In addition, there will be limited ability to access historical budget information. There will be extra manpower and time necessary to prepare budgets.

Revenue

Fare Reporting and the monthly posting process will be disabled. Tracking of revenue will need to be done on a manual basis. This will result in inaccuracies and be subject to fraud.

Pension Loan/Forecast

Valid data will not be processed on an automated basis. This will result in inaccurate loan balances. This will become a labor relations issue. There will be inaccurate information determination of pension plan type, employee age, and years worked. This will result in inaccurate pension information being given to employees. This is a labor relations issue.

Payroll

There will be inaccurate pay to individuals. Age calculations will be incorrect causing deduction calculation errors. Employee duration calculations will be inaccurate resulting in pension payment errors. Also the vendor will not support the package. This may result in the package failing. This will be a total nightmare.

Garnishment

The date of first garnishment will be calculated incorrectly. Deductions from employees checks will be incorrect. Balances of garnishments will be incorrect. Valid court orders will not be accepted. This will result in legal ramifications with outside agencies.

Fare Labor Act

There will be inaccurate pay adjustment calculations resulting in inaccurate pay to the employees.

Material System

There will be inaccurate replenishment of material to the storeroom resulting in stock outs. Backorders will be satisfied in an incorrect order. Various user reports will be inaccurate. These situations will result in an overall degradation of bus and subway repairs. Also monitoring and control of inventory will be impaired. This will result in inventory control which Is slower, more cumbersome, error prone, and more subject to fraud.

Purchasing, Receiving & Accounts Payable

Checks payable to the vendors will not be generated due to incorrect date comparisons. Vendor performance will be inaccurate and vendors will not be rated properly. Scheduled deliveries will be inaccurate. Many user reports will be inaccurate. Contract expiration dates will be calculated incorrectly. Many data entry screens will not accept data. All these situations will disable these system, necessitate that everything is done manually, and significantly slow down the time necessary to procure material and pay vendors.

<u>Signals</u>

Scheduling of inspection and servicing of the various components of the Signal System will be inaccurate. Requested maintenance history reports will be inaccurate. Reverting to a manual tracking of maintenance and inspections of signals will result in a less safe subway system, with more accidents and more lawsuits

<u>Bus Transit</u>

Mileage will be inaccurately recorded. This information is used both to schedule maintenance subway cars and to receive funding. This will result in more transportation breakdowns

<u>Train Trouble</u>

Train delay incidents will be inaccurately recorded. Management will not be able to evaluate daily performance and take corrective actions. Passenger satisfaction will be reduced with the result of reduced ridership

WHAT IS INDUSTRY DOING TO PREVENT PROBLEMS:

Organizations should be reviewing all applications it is directly responsible for and for applications that will not be replaced or retired by the year 2000 will be reviewed in detail. The applications that will exist past the year 2000 will be modified to correctly handle dates from both centuries. Most of the required changes will be completed by the end of 1998

There are two primary ways of correcting the year 2000 problem. The first is to expand all date fields to a four character representation and leave the existing software logic intact. The second is to leave the date fields as two characters but modify the software logic to handle the two character representation correctly. Look at each application separately and determine which approach is suitable and most cost effective.

In addition, plans for each application must be made, detailing the time frame and resources necessary for analysis, program changes, testing, conversion, and implementation. This includes all in-house developed and purchased software. The planning has to be done now or there may not be enough time to correct the year 2000 problem. In addition, since this problem is so widespread the resources necessary to make the appropriate changes will become more expensive and less available as the year 2000 approaches.

NOTE: Industry is not doing nearly enough to solve this problem.

WHAT RESOURCES HAVE BEEN ALLOCATED TO RESOLVE THE PROBLEM:

Industry has not allocated enough resources or even accepted the breathe of this problem

CAN THE SAME PRACTICES USED IN INDUSTRY BE USED IN THE PUBLIC SECTOR:

ABSOLUTELY.

WHAT TYPES OF PROBLEMS HAVE FIRMS ENCOUNTERED:

Most of the problems being encountered is organizations not taking this problem seriously. This problem is a project management (management) issue and not a technology issue. Organizations have not come to grips with this issue.

Mr. HORN. That is very well said.

We are going to hold questions until all of you have had a chance to testify, because we want not only Members to ask questions but we would like each of you to talk in dialog with each other if there is some concern in the testimony of one of your colleagues, so we enlighten ourselves by your discussion.

Mr. MARCOCCIA. Just one other comment, if I can. I think we keep saying industry is taking the lead. Clearly, in my view, the New York Transit Authority has been a leader in this issue for many years now. That is one of the reasons we are here. We have taken a proactive support, and our management have been supportive.

I don't feel that we will have all—all projects have difficult points in time. No projects are easy, they are all difficult. I feel confident we will do this at the least amount of cost. Our cost factor is less than 50 cents a line because we have applied some strategy and history that we have.

Thank you.

Mr. HORN. Our next witness is Mr. Nicholas Magri, the senior vice president for Securities Industry Automation Corp.

Mr. MAGRI. Thank you.

My role at Securities Industry Automation Corp. is the post-trade processing systems. That is where the vast majority of date problems could arise if they were to arise.

Securities Industry Automation Corp. is better known throughout the financial industry as SIAC. We were formed in 1972. We are a joint subsidiary of the New York and American Stock Exchanges.

Our purpose is to provide the highest quality, reliable, cost-effective systems for the stock exchanges, New York and the American, the National Securities Clearing Corp., the national markets, and the securities industry nationwide.

As a technological hub of the Nation's securities industry, we make it possible for the firms and marketplaces throughout the country to conduct daily business. Recognizing this unique responsibility, the technology we develop must be highly reliable. It must work on day one, and it must work every day thereafter.

Our on-time and up-time performance record is 99.99 percent.

Now what is the year 2000 problem?

You have already heard quite a bit about it. Ours is no different. The programs have been performing date arithmetic and date comparisons based on the year and certainly the year itself at the turn of the century does give rise to several problems, among these, but not all inclusive, are dates sorted out of sequence output. It either prints out machine readable—will probably have the year 2000 sorted before the year 1999 date sequence in historical files, which is the backbone of the industry. We will probably have the same problem.

Another problem we calculate the receivables and deliveries are received or delivered 3 days after the transaction is actually done.

A system goes from a transaction date of late December 1999 to early January 2000. The systems could encounter date sequence processing problems which could generate incorrect results in a problem in.

Another area is, we process failed or late transactions. Under certain conditions, a transaction can be submitted for processing after the fact. Therefore, a trade that was done in December 1999 may not get submitted until January 2000. We would have a reverse problem but a similar problem.

Security and broker master file updates. This tells us which brokers' firms are eligible for processing, and we generally input these with future dates. On certain occasions we even backdate them. These transactions could encounter processing problems.

Another area is dividend and interest payments. These are generally calculated into the future, and they could have a problem. These are only representative examples. There could be many others.

What's the impact if not addressed?

As a minimum, the output won't be properly date sequenced, and there will be many instances, or could be, where incorrect results injure the integrity of its data.

At the close of each business day, all accounts must be reconciled and balanced. Almost right doesn't count. It must be exact, exact, and must be exact every day.

First, each firm must self-balance and then separately balance with each of the depository trust company options, clerk, corporation, et cetera. This could become a very manual-intensive effort at the turn of century if not done properly.

What's SIAC and the industry doing to prevent problems?

At SIAC, the discovery stage Dan in mid-1993. At that time, we began an 18-month project at T+3 project. It is one of the largest and probably most complex projects we did. It affected almost every post-trade processing system as an adjunct to that project. The preliminary research was done at the year 2000.

At this time, we now have a formal project team in place. It is a world-class planning organization. So we have to identify all the third parties' software and hardware that may be affected. We have to coordinate with the financial industry whatever solution we at SIAC come up with minimize the impact on the member firms.

Within the industry, SIAC has taken an active role in providing awareness surrounding the year 2000. As a member of the association's data management division, we have continually provided awareness and actively participated in this organization's subcommittee devoted to the millennium issues. We have also participated in several nationally sponsored seminars related to the topic.

As a result of this participation, SIAC is aware that many, many firms in the financial industry are actively engaged in addressing the problem.

What resources have we allocated to resolve the problem? As I said, a formal project team has been established. The plan is to implement the changes in a phased manner over the next 3 years and be completed by January 1999.

At SIAC, whatever resources required will be allocated. As was done with the T+3 settlement project, it is expected that some basic coding changes will be assigned to contract programs.

Can the same practices used in industry be used by the public sector?

I would assume the answer is yes. Obviously, there will be specific variations on a theme, but generally, the same practices should hold true.

What types of problems have firms encountered?

The only one we consistently hear is the concern for the complexity involved in testing modified software and implementing it in stages over a number of years and do this in a nondisruptive manner.

Mr. Horn, we thank you very much for inviting us to testify.

[The prepared statement of Mr. Magri follows:]

Nicholas Magri
Testimony to the Subcommittee on Government Management, Information and Technology
April 16, 1996

Securities Industry Automation Corporation, better known throughout the financial industry as SIAC, was formed in 1972 as a joint subsidiary of the New York and American Stock Exchanges. Its continued purpose is to provide the highest quality, reliable and cost-effective systems to support the current and future business needs of the New York Stock Exchange, the American Stock Exchange, the National Securities Clearing Corporation, the national markets and the securities industry nationwide. SIAC plans, develops, implements and manages a variety of automated information-handling and communications systems that support order processing, trading, market data reporting, trade comparison, and clearance and settlement for a broad range of financial instruments.

As a technological hub of the nation's securities industry, SIAC makes it possible for brokerage firms and marketplaces throughout the U.S. to conduct daily business. Through the use of SIAC's extensive communications facilities coupled with sophisticated and extensive on-line trading support systems, SIAC provides automated routing and processing of orders to the New York and American Stock Exchanges' trading floors and sends execution reports back to member firms. On behalf of the Consolidated Tape Association, a consortium of the major U.S. exchanges, SIAC developed and operates the Consolidated Tape System (CTS) and the Consolidated Quote System (CQS). These real-time systems collect and integrate trade and quote data from the NYSE, AMEX and the regional exchanges and consolidate it into individual last sale price and last quote data streams and distribute this information to all approved vendors for dissemination worldwide. Similarly, for the Options Price Reporting Authority (OPRA), SIAC collects options trade and quote information from the U.S. options exchanges and consolidates it, also, for worldwide distribution. The availability of this consolidated equity and options data supports another function performed by SIAC for the industry--the operation of the Intermarket Trading System (ITS). This is an automated system, developed by SIAC, that enables trades in dually-listed securities to be executed across markets, based upon the best price, regardless of which exchange first received the order. CTS, CQS, OPRA and ITS systems help define the National Market System mandated by Congress. Development and operation of these systems clearly show SIAC's central role in meeting this mandate.

SIAC also supports and operates numerous regulatory and surveillance systems used by the New York Stock Exchange and, as facilities manager for the Intermarket Surveillance Group, SIAC helps support the surveillance needs of the other major U.S. securities and options exchanges as part of their efforts to help ensure fair and equitable markets.

Another major function of SIAC is to provide the systems support that enables the clearing and settling of close to 98% of all the nation's trading activity in stocks and bonds. SIAC's recent achievement in this area was the implementation of systems that support the shortened T+3 settlement period. This major project, which was in response to a requirement from the Securities and Exchange Commission to reduce risk exposure, provided a smooth transition from T+5 to T+3 settlement which affected the entire industry.

Recognizing the unique responsibility of its critical role, the technology SIAC develops must be highly reliable; it must work on day one and on every day thereafter. Through the application of meticulous planning, astute systems development, redundant systems configuration and comprehensive operational procedures, SIAC consistently achieves systems uptime of 99.99%. The collective end product of SIAC's performance is a record of reliable delivery of service to SIAC's customers during periods of dramatic volatility and rising share volume.

SIAC is very significant in the securities industry, yet SIAC is a relatively small company, consisting of about 1400 people. SIAC's people possess industry perspective, business knowledge and technical expertise.

Nicholas Magri
Testimony to the Subcommittee on Government Management, Information and Technology
April 16, 1996

What Is the Problem for the Industry?

The basic problem is that the four digit "Year" is represented by its last two digits (i.e., 95, 96, 97) with the first two digits assumed to be "19". Earlier data processing equipment had limited resources and there was a need to conserve space. Programs have been performing date arithmetic and comparisons based on the year-in-century and not on the year itself.

The turn of the century could give rise to several problems. Among these are:

1. Date Sorted Output
    Date sequenced output, either printed or machine readable, could have the Year 2000 sorted before the Year 1999 (i.e., since the last two digits of "00" could sort before the last two digits of "99").

2. Date Sequenced Historical Files
    A key industry resource is date sequenced historical files which are used for reconciliation and research. These would have the same problem as does Date Sorted Output.

3. Security Transaction Receive/Deliver (Settlement) Date Calculations
    Most security transactions are received/delivered three days (T+3) after the transaction is done. As the systems go from a transaction date of December 1999 to a settlement date of January 2000 - the systems could encounter date sequence processing problems which could generate incorrect results.

4. Processing Failed (or Late) Transactions
    Under certain conditions, a transaction may be submitted after the fact. Therefore, a trade that was done in December 1999 may not be submitted for processing until January 2000. These transactions could encounter processing problems.

5. Security and Broker Master File Updates
    Master file changes affecting Securities and Brokers are generally input with future dates and under certain special conditions with an earlier date. At the turn of the century these updates could encounter date sequence processing problems.

6. Dividend and Interest Payments
    Dividend and interest payments are calculated in advance of the actual payment date. At the turn of the century these updates could encounter processing problems.

The above are representative examples of the type of problems that could affect financial industry systems. There are many others.

Nicholas Magri
Testimony to the Subcommittee on Government Management, Information and Technology
April 16, 1996

What is the Impact if not addressed?

As a minimum, the output may not be properly date sequenced; and there will be many instances where incorrect results could be generated.

What is SIAC and the Industry doing to prevent problems?

The discovery stage commenced in mid 1993. At that time, SIAC began an 18-month project known as T+3 Settlement. This project affected most of SIAC's post-trade processing systems. As an adjunct to this project, much of the preliminary research was done for the Year 2000.

At this time a formal project planning team has been established. Its charter is:

1. Identify all systems/programs affected.
2. Identify the many third party vendor supplied software that require change.
3. Coordinate with the financial industry to ensure that SIAC is solving the Year 2000 problem in a manner that minimizes the impact of its external interfaces with the rest of the industry.
4. Incorporate all known enhancements and system re-writes into the project plan.
5. Insure that all new development will be Year 2000 compliant.

SIAC has taken an active role in promoting awareness of the operational issues surrounding the Year 2000 change within the industry. Through its membership in the Securities Industry Association's Data Management Division, SIAC has continually promoted awareness and actively participated in this organization's sub-committee devoted to the millennium issues. SIAC has also participated in several nationally-sponsored seminars related to the topic.

As a result of this participation, SIAC is aware that many firms in the financial industry are actively engaged in addressing this problem.

What Resources have been allocated to Resolve the Problem?

A formal project team has been established. The plan is to implement the changes in a phased manner over the next three years. In many cases, the change will be incorporated into other projects. At SIAC, whatever resources are required to accomplish this task will be allocated. As was done with the T+3 Settlement project, it is expected that some of the basic coding changes will be assigned to contract programmers.

Nicholas Magri
Testimony to the Subcommittee on Government Management, Information and Technology
April 16, 1996

Can the same Practices Used in Industry be used by the Public Sector?

I would assume the answer is YES! Obviously, each specific sector would have variations-on-a-theme.

What types of Problems have Firms Encountered?

A recurring concern is the complexity involved in testing modified software and implementing it in stages in a non-disruptive manner.

Mr. HORN. Our last witness on this panel is Mr. Michael Tiernan, and he is the vice president of information systems at C.S. First Boston Corp.

And I understand you are testifying in your capacity as chairman of the Securities Industry Association Data Management Division Year 2000 Subcommittee, and I believe you are accompanied by Mr. Nicholas Magri, president of the Securities Industry Association.

OK. Please proceed, Mr. Tiernan.

Mr. TIERNAN. Chairman Horn, Representative Maloney, and members of the subcommittee, thank you for inviting me to testify today. My name is Michael B. Tiernan, and I am vice president of information systems at First Boston Corp. I have 36 years of experience on Wall Street. I am testifying in my capacity as chairman of the Securities Industry Association's Data Management Division Year 2000 Subcommittee and ask that a copy of my written statement be included in the record.

I am accompanied by my colleague, Mr. Nicholas Magri, president of the Securities Industry Association, Inc., more commonly known throughout the financial industry as DMD.

The DMD develops efficient and uniform practices and procedures in all areas associated with the processing and clearance of data in the securities industry. That is something many people would just as soon ignore, but it raises business, technological, and economical issue that are critical to the securities industry and, more importantly, our customers.

If left unaddressed, the consequences could be catastrophic to all entities that use and depend upon computers, which is why it is important and appropriate for this subcommittee to hold this hearing today.

In my written testimony I have provided an overview of the problem, including a brief history of how the problem developed with respect to the securities industry specifically.

In the interest of time, I would like to digress from my statement and summarize my remarks. I will begin by defining the year 2000 problem in the simplest terms possible. Many systems applications do not consider the century. Probably 90 percent of all computer applications will read "00" as 1900 instead of 2000.

The reason for this is, in the 1960's programmers cutoff the first two digits of each calendar year in order to save memory in mainframe computers. Most knew it would be a problem but never thought the same system would be in place so many years later.

Our concern about this issue stems from the fact that the financial industry services will be especially hard hit by problems related to the year 2000. So the industry developed and formed the Year 2000 Subcommittee in September 1995 to promote industry awareness.

Over the last several months, our subcommittee has identified several problems that are common in many financial service firms.

For example, financial service firms' ability to clear and settle transactions on a timely basis will be jeopardized. Interest may not be properly credited to accounts, harming individual investors. Access to investors' accounts could be denied. Deposits or trades

might not be credited to an account, and customers' funds would not be available, affecting liquidity.

Computer calculations of long-term loans may abandon the process at 2000 without registering an error.

For example, if a loan starts in 1996 and ends in 2000, the computer would return to the year 1900, and it would be calculated as a minus 96-year loan instead of a 4-year loan.

The process we are using to address the year 2000 is not industry specific and could be used by the public sector. In fact, we recommend that the public sector follow a similar plan that includes the same basic features: Promoting awareness, setting up working groups, targeting problems, identifying possible solutions, developing an industry testing mechanism to assure compliance and devise an effective method of communicating such information within the entity.

Mr. Chairman, the U.S. capital markets and financial services industry today are the most competitive, dynamic, and innovative in the world. This industry is a tremendous natural resource affecting all areas of the global economy, providing low cost capital to businesses and Government seeking new opportunities for investors.

Because computer technology is so critical to its proper functioning, we take year 2000 very seriously and devote the necessary resources to ensure that customers do not lose money and are not inconvenienced or harmed in any way.

We are certain that the securities industry will be prepared for the year 2000. We have a proven track record that showed we immediately meet the challenge. We just hope the businesses and Government entities we depend on and do business with globally will be ready also.

Mr. Chairman, we have considerable expertise and stand ready to assist you in any way possible. Already our subcommittee has accomplished a great deal, and we will continue to move forward.

The year 2000 is not a security industry problem. It cuts across every industry, business, and Government. We look forward to working with you to address the problem. Thank you for inviting us to testify.

I would be pleased to answer any questions that you may have.

[The prepared statement of Mr. Tiernan follows:]

TESTIMONY OF

MICHAEL B. TIERNAN

CHAIRMAN

YEAR 2000 SUBCOMMITTEE

DATA MANAGEMENT DIVISION OF WALL STREET

SECURITIES INDUSTRY ASSOCIATION

HEARING BEFORE THE

SUBCOMMITTEE ON GOVERNMENT MANAGEMENT,

INFORMATION AND TECHNOLOGY

APRIL 16, 1996

Chairman Horn, Representative Maloney and Members of the Subcommittee, I appreciate

the opportunity to testify today. My name is Michael B. Tiernan and I am Vice President

of Information Systems at C.S. First Boston Corporation. I am testifying in my capacity

as Chairman of the Securities Industry Association's Data Management Division Year

2000 Subcommittee. I ask that a copy of my written statement be included in the record.

The Data Management Division of Wall Street, Securities Industry Association

Incorporated -- more commonly known throughout the financial industry as the DMD --

has served the needs of the Wall Street community for over 60 years.

Our organization develops efficient and uniform practices and procedures in all areas

associated with the processing and clearance of data in the securities industry. We help

members solve common problems while promoting cooperation and friendship among members, member organizations, and regulatory agencies. Above all, we strive to ensure the welfare of our members.

The DMD encompasses all phases of pre- and post-settlement trade processing, information technology, and data communications. Our expertise has made us a necessary and respected arm of the Securities Industry Association (SIA).[1]

The DMD -- in conjunction with our Advisory Board made up of stock and futures exchanges, self-regulatory organizations, clearing corporations, and banks -- has been instrumental in establishing a framework for processing of our member's business transactions. Our members share their expertise and ideas as they work together on our various committees. The elected officers and board members represent all aspects of this dynamic industry, giving us the broadest possible industry perspective, business knowledge, technical expertise, and working experience.

Drawing on the considerable expertise of our members, we formed a Year 2000 Subcommittee in September 1995 to promote industry awareness of the business and technological issues resulting from the Year 2000 and subsequent millennium change.

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[1] The Securities Industry Association is the leading proponent of capital markets, bringing together the shared interests of about 700 securities firms throughout North America to accomplish common goals. SIA members -- including investment banks, broker-dealers, specialists, and mutual fund companies -- are active in all markets and in all phases of corporate and public finance. In the U.S. SIA members collectively account for approximately 90 percent, or $100 billion, of securities firms' revenues and employ about 350,000 individuals. They manage the accounts of more than 50-million investors directly and tens of millions of investors indirectly through corporate, thrift and pension plans.

Why is Year 2000 a Problem for the Securities Industry?

Problems associated with the Year 2000 have their roots in the early years of computers and accounting machines. In those days, data processing was done on keypunched 80-column cards, which necessarily limited the amount of data that could be entered on any one card. Because of space constraints, date fields were usually entered in the format "MMDDYY" or "MMDDY" without reference to the century.

As technology evolved from keypunch cards, the shortened date field sizes were carried forward onto disc storage devices and magnetic tapes. Because disc storage space was expensive at first, all data elements were downsized to make the best use of the limited space available. Many of these systems -- known today as "legacy systems" -- still perform essential processing functions in the securities industry. A majority of the legacy systems assume that the first two digits of the year is "19" in the MMDDYY format. If the MMDDY format is used, the system still assumes "19" is the century, but the code is modified every ten years with a prefix 7Y, 8Y, or 9Y to address the date logic problem.

In the Year 2000, however, legacy systems will have dates that look like 010100 (MMDDYY), 01010 (MMDDY), or 00001 (Julian date YYDDD). Since 00 is less than 99, "less than" or "greater than" logic will no longer work. Legacy systems only recognize the last two digits for any given year, meaning that the Year 2000 ("00") cannot be read properly, and calculations cannot be made beyond 1999. This has very serious implications for the financial services industry because our firms will no longer be able to sort dates, calculate money (i.e., interest earned), or count the number of days based on an algorithm using "from date" or "to date" logic. The securities industry uses many different dates to support transaction- and decision-based processing applications. Some examples are "trade date," "settlement date," "process date," "stamp add date," "record

date," "ex date," "payable date," and "maturity date." Unless properly formatted, any of these dates will cause processing problems for the industry and pose risks to our customers.

What specific problems have securities firms encountered?

Over the last several months, our Subcommittee has identified certain problems that are common in many financial services firms, for example:

- Application software will not accept settlement dates beyond the year 1999.
- Debt instruments that mature after the turn of the century will experience problems with their maturity dates.
- Problems have been encountered with figuration and computational models of various natures, such as risk-management, hedging, and derivatives.
- Computer calculations of longterm loans may abandon the accrual process at 2000, without registering an error. For example, if a loan starts in 1996 and ends in 2000, the computer would return to year 1900, and it would be calculated as a minus 96 year loan instead of a four year loan.

Additionally, the Subcommittee is working towards a solution on the following problems that affect all date-dependent applications:

1. Computer dates rolling into the year 2000

Some machines will return to a base date (e.g. 1900, 1980, etc.) because the internal system clock is based on the displacement from a base date. These machines will not

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recognize "00" and will automatically reset to the default date programmed into the machine.

Some manufacturers may bring mainframe computers into "Year 2000 compliance" if the users have the appropriate operating systems software. Other manufactures of certain mid-range machines offer a date-windowing technology that pushes the problem forward to 2040, but does not fix it completely. The most common problem, however, may be related to personal computers (PCs). When the date wraps to 2000, the Disk Operating System (DOS) will jump to 1980, 1984, 1900, or 1/4/1980 depending on the machine's processing chip.[2] You can experience these problems first hand by setting the date and time on your PC to 1999-12-31 (and 2000-02-28) at 23:59:30 hours, and letting the clock run. What happens when you try to use your personal system will depend on your processing chip, the version of DOS, and level of the Year 2000 compliance of the software you execute.

2. Year 2000 leap year

To complicate matters further, Year 2000 is a leap year. Normally the year must be divisible by four, but at the century, the year must also be divisible by 400. If, as we have noted, the computer assumes "00" to be "1900," it will not assume there to be a February 29 that year.

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[2] We have also identified a problems with some home financial software packages, which reset the date to 1980 or 1984 if the user directly inputs the date "2000-01-01" through the DOS DATE command. In addition, the date functions in the first releases of popular spreadsheet type software did not handle the date "February 29, 2000" correctly.

3. Time stamps

Time stamps are often buried inside encoding schemes. If the year-in-century is used for the high-order digits of a serial numbering system, then any program that depends on increasing serial numbers will fail.

4. Magnetic Media retention management

The five digit label that is used in many mainframe facilities for archive and tape management software also follows the convention that programmers use the retention date of 99365 -- the 365th day of the 99th year or December 31, 1999 -- if they want a tape to be kept indefinitely. Since 1999 is now only three years away, this logic is no longer valid as an infinite date because 00001 is less than 99365 and the "less than" and "greater than" logic becomes invalid. This situation may only occur when using versions of such software that are not Year 2000 compliant.

5. Date formats and associated "less-than" and/or "greater-than" logic

The following are examples of some date format problems that will occur because computers using "less than" or "greater than" logic will assume 00 (i.e., Year 2000) to be less than 99:

- Julian date (YYDDD) logic does not work;
- Dates like YYMMDD, YMMDD, MMDDYY do not work;
- Some programming languages have compile dates as YYMMDD; and
- 00 in the date year may be invalid when doing application edits.

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6. Figuration modules

All computational result sets must be verified for processing accuracy prior to and after implementing Year 2000 compliance logic as determined for the calculation of money (i.e., calculation of interest) and/or number of days. Thoroughly testing the solutions will be a time-consuming but necessary exercise. For the sake of our customers, we have to ensure that any of the changes we make will not fail when the clock strikes midnight at the turn of the century.

What is the impact if not addressed?

If Year 2000 problems are not addressed, the consequences may be catastrophic from a business and economic perspective. Financial services firms' ability to clear and settle transactions on a timely basis would be jeopardized. Individual investors could be harmed because interest may not be properly credited to accounts. Access to investor accounts could be denied. Additionally, liquidity could be affected because deposits or trades might not be credited to an account and customers' funds would not be available.

Industry action

Since the financial services industry would be directly affected by problems related to Year 2000 and subsequent millennium change, the DMD formed a Subcommittee to promote industry awareness of the business and technology issues last September. A working committee comprised of member firms was formed and meets on a regular basis to identify common problems and define alternative solutions while insuring the development of efficient and uniform practices and procedures in the industry.

7.

The Subcommittee has accomplished a great deal in a short time, including:

- Identification of numerous issues resulting from the Year 2000 and Millennium change.
- Identification of specific manufacturers, machine models, and software having the potential for failure.
- Identification of several approaches addressing the issues and problems identified so far.
- Communication of all of our findings to our members on a timely basis.

The Subcommittee is planning to:

- Conduct a detailed survey to solicit specific information from member firms required in order to further gauge industry readiness.
- Conduct a similar survey of industry service bureaus, exchanges and other entities external to the industry.
- Devise a method to confirm our findings with the entities of origin.
- Conduct a controlled industry-wide test scenario with service bureaus, exchanges and other entities to ensure industry-wide compliance concerning the Year 2000 and the millennium change.

What resources have been allocated to resolve the problem?

As an organization, we have devoted substantial resources to solving the Year 2000 problem. As I have described, our Subcommittee has studied the problem extensively, defined areas of concern, and communicated these issues to members. We will continue

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to work with our members to help them address these problems in the manner that causes the least disruption to customers and investors.

Every firm, however, must decide for itself which approach to Year 2000 works best. At this point, we do not have sufficient data to properly estimate the exact resources which will be necessary for the industry as a whole. Resource levels, however, will vary from firm to firm, depending on size, complexity, and multitude of processing platforms and applications. Additionally, actual resource levels may vary further depending on outsourcing initiatives involving fixed and or variable costs. As an industry, however, we take Year 2000 very seriously, and will devote the necessary resources to ensure that customers do not lose money and are not inconvenienced. We are certain that the securities industry will be prepared for the Year 2000, but we are concerned that other organizations and entities with whom we interact and rely upon will lag behind.

Can the same practices used in the Industry be used in the Public Sector?

The process we are using to address Year 2000 is not specific to an industry, and could be used by the public sector. In fact, we recommend that the public sector follow a similar plan that includes these features: promoting awareness, setting up working groups, targeting problems, identifying possible solutions, and devising an effective communications system within the entity. Mr. Chairman, we have considerable expertise and stand ready to assist you in any way possible. The Year 2000 is not a securities industry problem -- it is an issue that cuts across every industry, business and government. We look forward to working with you to address this challenge.

Thank you for inviting us to testify. We would be pleased to answer any questions that you may have.

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Mr. FLANAGAN [presiding]. Thank you very much.

Mr. Horn had to go vote. He will return shortly. Until then, let me begin with some of the questioning.

Mr. Tiernan, I find your testimony particularly fascinating because, for the first time since I have begun looking at this, I cogently understand, I think, what the problem is and it lies in the less than, greater than logic.

What is the security industry doing in a very specific way to overcome this and to deal with this problem in a very practical way? Because quite often Government mirrors industry and not always the other way around. We often set the standard, but that is only after the standard has been known. What are you guys up to?

Mr. TIERNAN. We have studied this appropriately, and we are on top of this.

We have established the Year 2000 Subcommittee that has made all member firms aware of the problem. We will coordinate all the construction, testing, and implementation that needs to take place so that we will move into the year 2000 without problems.

Mr. FLANAGAN. Undoubtedly you are spending a fair amount of money addressing this problem. As our friend from New York explained it, it is an unglamorous job. Do you have any idea what it is costing so far?

Mr. TIERNAN. Some sources estimate the cost is going to be $3 billion for the industry. All firms themselves have to address the cost for the solution.

We are all independent firms. We all have different ways of doing things and must assess this cost on our own. Our clients are most important to us, and the industry historically spends more money on technology than any other industry, and we will continue to do so. We will spend as much money as needed to assure that our clients are not at risk.

Mr. FLANAGAN. The information technology has not been known for its individuality, if you will, and speak to each other in a common language, digital, or whatever that may be is essential. Do you see a difficulty arising in the future of different important segments of our Nation, Government one of them, solving its problem differently?

Mr. TIERNAN. We have a plan, and I believe that every industry, including the Government, can follow that approach——

Mr. FLANAGAN. Thank you. That was easy.

Mr. TIERNAN. We have put together what we consider to be a methodology for rolling into the year 2000. We have sent out survey forms, or will be sending out survey forms, to all the firms involved in the industry, hoping we will get information back as to where each firm stands with the year 2000 problem.

Testing has to be coordinated streetwise. In order to prove to ourselves that we actually can be 2000 compliant, we must do test streetwise, including all member firms, outside agencies, and exchanges. It is easy to say that you are year 2000 compliant, but we must prove it.

Mr. FLANAGAN. Could you broadly elaborate for the uninitiated exactly what the solution is, how you plan to go about this?

Mr. TIERNAN. We plan to go about this by doing an inventory of all of our systems. We then have to do the analysis that is associ-

ated with that. Once we determine what code is good and needs to be modified and what code is dead wood and needs to be put on the side, we have the ability then, based on the resources that we have set aside, to do this job, to go in and make the changes to the particular codes—to the particular code in the programs.

Mr. HORN. This is a line-by-line analysis?

Mr. TIERNAN. This is a line-by-line analysis in some instances. There are tools today that will give us the ability to go in and find the dates within the application programs.

We will also be able to follow the life cycle of a data element so that if data is moved to Joe, we will know that Joe is a date, and we can then track the logic associated around the different data elements to see if we need to make a change. If so, we will appropriately make the change.

Mr. FLANAGAN. I am finished.

Mrs. MALONEY. I have to leave to go vote. Lately—I want to ask if I could get a copy of your survey. We developed one for Government. I would like your input on that.

Mr. TIERNAN. Sure. We are here to help. This is not just an industry problem for the securities industry, it is a worldwide problem. We are all here to try to solve this problem.

One of our positions is, we are available with our expertise on the street to help wherever possible.

Mr. MAGRI. If I could add to that, one of the keys is, we work very closely at the Data Management Division for individual firms to come up with a solution. As I said before, that doesn't work with the central—or between firms. It is the same as not solving the problem.

For example, if we went and solved it and made everything four fields for the date and the rest of the industry left as two but kept an indicator saying which century they were in, that doesn't work. We work very closely with them to make sure whatever solutions we come up with as an industry work.

Mr. FLANAGAN. My larger question is, your industry comes up with a solution and you even are successful in making it industry-wide. What happens when you have to talk to us or you have to talk to clients who are not in your industry but who are your clients who adopt it or decide a different solution is better?

When you merely compare pieces of paper, you could do that, but these computers run into other problems, larger and unintended problems that can have catastrophic proportion when one tries to talk to each other. That leaves it in there—greater-or-less-than logic—not solved in the same way, or so I understand; is that right?

Mr. TIERNAN. That is one of the reasons it is not just a date problem. We indeed have a scope problem. We have to come up with a methodology and a management concept on how to handle this year 2000 problem.

We need to include all of the entities that we deal with, including the Government, and make sure that all entities that we interface with are ready to process in the year 2000.

Mr. MARCOCCIA. Can I answer something to this? I think what we did at the Transit Authority was that any files that were external files from one application to another or external to a bank, that

they would be eight digits long, and the reason for that is, the ANSI standard is eight digits, Microsoft and the big vendors are eight digits. So what you did internally, some of our solutions to provide a logical solution not to expand a field for that particular application, we would not expand a field for that file. If we have to produce a file for the outside, we will produce an eight-digit field.

So we can develop a standard that says—and I think ITAA is the place to do that—what you do internally with their own application, any external files will be eight digits long. That is really what the standard is and it hadn't had come out in 1994 and 1995. That is one thing we did for dealing with external files so we would not be in any debate, and we should not be in this debate now. That is the issue.

Mr. FLANAGAN. When should we have that debate?

Mr. MARCOCCIA. I think we can answer that by creating a standard that says, regardless of who you are, if you are going to receive a file from someone eight digits long. We did infrastructure building back in the late eighties, early nineties, that allowed us to——

Mr. FLANAGAN. That is terrific. That is a good thing indeed.

I have one question that needs to be asked for the record here. If you could all answer that portion, the software and computer applications at your organizations, do you estimate will or have been affected by this date problem in an untimely manner?

Mr. MAGRI. We assume that on our post-trade systems where we have approximately 80 systems, it will probably affect 40 to 50 of them, some much less than others.

Mr. MARCOCCIA. About 80 percent of our portfolio have dates with our strategy of replacing certain systems. We are hoping to re-place about a third of our systems, so about two-thirds of our systems will have to be addressed to make them 2000 compliant.

Mr. TIERNAN. Our organization develops in the trade clearance and settlement, while we are basically a trade organization that promotes uniformity to work with the exchanges, service bureaus, SRO's and other entities, such as State and Federal Governments.

So we are in a good situation in a sense. We do not have propri-etary software that we need to change in order for our organization to remain in business on the first day of business in the year 2000.

But our challenge here is really to assist the industry, and that includes all the service bureaus and advisories as well as the Gov-ernment, in coming together with the uniform plan and help exe-cute that plan so that we do not fail, as a Nation and a country, to service your constituents and our shareholders and investors.

Mr. FLANAGAN. Often the same people the Government excluded.

Do you have an estimate for your industry?

Mr. TIERNAN. Some initial estimates say 90 percent of the appli-cation which was in our industry will need to be re-evaluated and perhaps changed.

Mr. FLANAGAN. What is the New York Transit Authority spec on this? Do you have any idea at all?

Mr. MARCOCCIA. Minimal. We completed the analysis. We did it in house, two people part-time for 4 months. We did the form, exe-cuted the pilot with internal staffing, which was really minimal.

Let me talk a little bit about the pilot. If we were to use the dollar line estimate, or whatever, or even the 75 cents a line estimate based on our methodology in dealing with the pilot, we went from that pilot costing $80,000 to $15,000.

What we did was, when we analyzed each of our applications, we took a technical approach for each. How should we solve this particular application?

For instance, in our general ledger system we decided at that point to replace the way the GL was packaged for another application with a current initiative that is going to replace our capital program management system, and the two systems that belong to the TA. Those will be implemented in 1997, 1998. If it's a year late, we are in good shape.

We also analyze those programs, because if those applications don't happen on a certain date, we have to employ a system to make those year 2000 compliant.

Mr. FLANAGAN. Do you have any idea on what you expect to spend?

Mr. MAGRI. We don't have a sense yet, because as part of that T+3 project we have had about 23 developers on that project, and we did a lot of our homework then, so we don't even see our cost yet.

If we only did the date changes and didn't incorporate anything else with the project, I would suspect it would be less than the T+3 projects we completed this year. That is just a guess at this point.

Mr. FLANAGAN. Let me relinquish the chair.

Mr. HORN. Let me just say, if it has not been mentioned, we have had to break for a vote, and it is one of those great substantive votes that Congress acts on, which is the approval of the Journal of the proceedings of the previous day.

It doesn't matter what you see on C–SPAN. It doesn't matter what the Record says. It is what is in the Journal that counts. Sorry to have to leave the room.

So apparently we are still asking that question, or are we ready for the next question?

OK, what is the status of preparation in other countries, is I think one question we all have, and what is our risk if they fail to address the year 2000 issue with the idea of——

Mr. MARCOCCIA. Typically I think Europe and the other nations tend to lag behind us with developing these type of things.

I have been invited to speak at a year 2000 conference in South Africa June 6 and Johannesburg on June 7 and Cape Town. So I guess there is a little interest there I will find. I will come back next time and let you know what happens.

Mr. HORN. Do let us know. They might have some solution to this they would use.

Mr. MARCOCCIA. There is no magic pill, Congressman, unless you can actually legislate that the year 2000 gets pushed back. If you can do that, I think we are in good shape.

Mr. HORN. There are some in Congress who think they can do it.

Mr. MARCOCCIA. I think Ronald Reagan can do it.

Mr. HORN. Let me ask you, in terms of each other's testimony, do any of you have any disagreements or nuances with what some

of your colleagues said? I would like to find out what, if there is a difference of approach or opinion.

Mr. TIERNAN. I think we all have the same approach. It is a common problem. SIAC, the Securities Industries Association, works together with the Data Management Division and the SIA to make sure that our clients are served well and we do not put our clients at risk.

Mr. HORN. Now a question that we have raised with the previous panel has come up a number of times: How important has it been that the senior management actively support the year 2000 projects in order to get them initiated, properly funded, and the necessary human resources for their success?

Have you had any problem in your respective organizations, or did anybody at the senior levels understand this is a serious problem?

Mr. MAGRI. We had absolutely no problem in our corporation. As soon as it was brought up, the answer was "Yes, do whatever it takes; do it." We must do it and be there at least a year in advance to the industry test.

Mr. MARCOCCIA. In my organization there hasn't been a problem, but I think there is a problem to the industry.

I have been invited on a couple of occasions to speak to a senior manager because the middle manager is afraid to go attack it because it really is bad news. We are going to spend a lot of money, millions of dollars. I believe it is a key issue, and I believe you are not getting people because they are concerned about going to senior management with bad news.

Mr. TIERNAN. Senior management is aware of the problem, and we need their support to be successful in the year 2000, and we are getting it so far.

Mr. HORN. That's fine. I think that rounds out what we wanted to hear from this panel. I thank you all very much for coming down here. The staff on both sides might well have some followup questions; if you would be so kind as to reply to those, we would appreciate it. We would like to put them in the record at this very point, or wherever it is relevant in terms of the subject matter. Of course, the oath continues in answer to those questions.

Thank you very much for coming.

Panel three will come forward.

Please rise and raise your right hand.

[Witnesses sworn.]

Mr. HORN. I'll swear in the other witnesses later. Mr. Muñoz has just come in.

Is Mr. Paige in the room? There is a traffic jam here, somewhat like the year 2000.

Let me swear Mr. Muñoz. Raise your right hand.

[Witness sworn.]

Mr. HORN. All four have affirmed.

We will start with Mr. Mesterharm, the Deputy Commissioner for Systems of the Social Security Administration. He is accompanied by Ms. Kathleen Adams, the Associate Commissioner of the Office of Systems Design and Development of the Social Security Administration; and Ms. Adams has chaired the Interagency Working Group on the year 2000.

STATEMENTS OF D. DEAN MESTERHARM, DEPUTY COMMIS-
SIONER FOR SYSTEMS, SOCIAL SECURITY ADMINISTRATION,
ACCOMPANIED BY KATHLEEN ADAMS, ASSOCIATE COMMIS-
SIONER, OFFICE OF SYSTEMS, DESIGN AND DEVELOPMENT,
SOCIAL SECURITY ADMINISTRATION, AND CHAIR, INTER-
AGENCY WORKING GROUP ON THE YEAR 2000; EMMETT
PAIGE, JR., ASSISTANT SECRETARY FOR DEFENSE COM-
MAND, CONTROL, COMMUNICATIONS AND INTELLIGENCE,
DEPARTMENT OF DEFENSE; AND GEORGE MUÑOZ, ASSIST-
ANT SECRETARY FOR MANAGEMENT AND CHIEF FINANCIAL
OFFICER, DEPARTMENT OF THE TREASURY

Mr. HORN. So if you would like to proceed, Commissioner Mesterharm, we would be delighted to hear from you.

Mr. MESTERHARM. Mr. Chairman, I appreciate the opportunity to discuss the year 2000 project at the Social Security Administration. I would like submit my full statement for the record.

Mr. HORN. All statements are automatically put in the moment you are introduced.

Mr. MESTERHARM. I think I would like to start out, since Mr. Schick was so forthright in saying that he was part of the problem, I have been in the industry for 30 years, and during the first half of that part of my career, I have written several hundred programs, and most of those used two-digit years. And as was stated, that was the standard at the time and that was the appropriate thing to do. Now, however, we have to deal with that issue because times have changed.

Mr. Chairman, a unique event will take place on January 1, 2000. On that day we will experience the first century change since the start of the computer era. This event proposes enormous challenges for the data processing community as public and private sector agencies around the world prepare for the single largest integration feat since computers entered our daily lives.

I won't go into explaining what the problem is; I think the previous testimony has identified that. The solution to the problem is obvious, but labor intensive. Everywhere in our computer programs and operations where we add, subtract, compare, or sort, using a two-digit year, we will need to substitute a four-digit year. While that sounds simple, our experience shows us that implementing it is far from a simple task.

There is no way to create a technical quick fix to this problem. Virtually all computer systems rely on dates to some extent, but organizations such as SSA, which are extremely date-sensitive, are at great risk if the year 2000 conversion process is not done on time and properly.

At SSA there are two complicating factors in the conversion process—one, the sheer 30 million lines of software now in use. The other is that there is no fully automated way to review the software, and each line must be examined individually to see if a change is needed. Our initial estimates indicate that it will take approximately 300 workyears to make and test the necessary changes, and the entire effort throughout SSA could require many more workyears. Regardless of the amount of workyears needed this activity cannot be deferred.

Of course, we are not the only organization faced with this problem, or the only one involved in addressing it. Every organization in the world, including every Federal and State agency that uses computers, must address this very problem. I am proud to report that SSA is in the forefront in planning for and dealing with this issue. In fact, SSA began examining the problem in 1989. We have changed the formats of dates in our major data bases to include the century and begun making changes to our application software. All of our new software we are developing is, of course, year 2000 compliant.

We will have all year 2000 changes made by December 31, 1998. This will give us an entire year to use the millennium changes in our production systems, ensuring that our current processing is unaffected and the year 2000 changes also function as designed.

I would like to briefly mention that the Office of Management and Budget asked SSA last year to lead interagency discussions designed to increase the awareness of the year 2000 issue and encourage the sense of urgency concerning changes needed. The year 2000 committee chairperson is Ms. Adams. The committee began meeting in November 1995 with only a few representatives attending, but the number has grown to more than 20 participants and that number grows with every meeting.

It is important to keep in mind that each organization wants to find solutions that meet its unique needs and that there is no single approach that all agencies can employ. The purpose of the Interagency Committee is to discuss crosscutting aspects of the problem such as interagency data exchanges and availability of various vendor products.

Furthermore, we believe this group is meeting its objective to raise awareness of this issue and encourage timely action. To this end, SSA and the Year 2000 Interagency Committee will be sponsoring a Year 2000 Congress for all Government agencies on May 2, 1996 in Washington, DC. At this Congress, Government agencies and private sector firms will share their experiences and approaches for addressing the year 2000 problem in their organizations. Vendors that have year 2000 solutions will also be present to answer questions and distribute product literature.

In conclusion, Mr. Chairman, it would be impossible to overstate the importance of a smooth and timely transition of computer operations to accommodate the need to reflect four-digit years as we enter the 21st century. I can assure you that SSA will continue to complete this project on time.

[The prepared statement of Mr. Mesterharm follows:]

MR. D. DEAN MESTERHARM,
DEPUTY COMMISSIONER FOR
SYSTEMS
SOCIAL SECURITY ADMINISTRATION

Mr. Chairman and Members of the Subcommittee:

I appreciate the opportunity to discuss the Year 2000 Project at the Social Security Administration (SSA), and I thank you for your efforts to focus attention on a matter which urgently needs to be addressed. In your letter of invitation you asked me to describe what we are doing to prevent breakdowns in our systems and whether Federal agencies are aware of the problem. I will begin by outlining the reasons why change is needed and what we are doing to address the problem, so that the transition to the new century is a smooth one.

Reason Change Is Needed

Mr. Chairman, a unique event will take place on January 1, 2000. On that day, we will experience the first century change since the start of the computer era. This event poses enormous challenges for the data processing community, as public and private sector organizations around the world prepare for the single largest integration feat since computers entered our daily lives.

The reason that the century change poses a problem is that many computer programs store and use only the last two digits of a year and assume that the first two digits are 19. Under this practice, computer logic operations work as long as dates are in the same century, but problems arise when it is necessary to use dates in two different centuries. For example, subtracting December 31, 1995, from December 31, 2005, to determine someone's age would produce the incorrect answer of minus 90 instead of the correct result of 10.

The interaction of dates among different programs, systems, and agencies is one of the factors which gives the Year 2000 issue such complexity. Timing considerations become very important because either the sending or receiving agency will need to convert files from one format to another, unless both are ready to make their Year 2000 changes at the same time. For example, every employer in the United States with 250 or more employees must report their employees' earnings to SSA in some form of magnetic media. It is unlikely that they will all be converted at the same time. It is more likely that they will process their reports through a filtering program to substitute the appropriate date format.

<u>Labor-Intensive Process</u>

The solution to the problem is obvious, but labor intensive, for organizations such as SSA which depend heavily on computer operations. Wherever we currently add, subtract, compare, or sort using a two-digit year, we will need to substitute a four-digit year.

While that sounds simple, our experience shows us that implementing it in computer systems is far from a simple task. There is no way to create a technical quick-fix to this problem. Virtually all computer systems rely on dates to some extent, but agencies such as SSA which are extremely date-sensitive are at greater risk if the Year 2000 conversion is not done on time and properly. At SSA, there are two complicating factors in the conversion process. One is the sheer size of the task. SSA has over 30 million lines of software now in use. The other is that there is no automated way to review the software. Each line must be examined individually to see if a change is needed. Our initial estimates indicate that it will take approximately 300 workyears to make and test the necessary changes, and the entire effort throughout SSA could require many more workyears. We are currently in the process of refining our estimates of total workyears which will be needed. Regardless of the amount of workyears needed, this activity cannot be deferred. We are planning to complete this project with in-house resources, but that means that, if additional resources are not budgeted, the resources for this critical project will not be available to do other systems development and modernization projects that would assist in processing increasing workloads with decreasing staff.

Of course, we are not the only organization faced with this problem, or the only one involved in addressing it. Every organization in the world, including every Federal and State agency that uses computers, must address this very problem. I am proud to report that SSA is in the forefront in planning for and dealing with this issue. In fact, SSA began examining the problem in 1989. We have changed the formats of dates in our major data bases to include the century and have begun making changes to our application software. All of the new software we are developing is, of course, year 2000-compliant.

As part of our early efforts, we conducted pilots, involving

representative programs, and studied the time required to modify them for date changes. These pilots raised the awareness of our personnel of the amount of time and complexity the entire project would entail, and gave us an indication of how to schedule the work to be done.

We will have all Year 2000 changes made by December 31, 1998. This will give us an entire year to use our millennium changes in our production systems, ensuring that our current processing is unaffected and that the Year 2000 changes also function as designed. Of course, while we are making these changes to all our systems, our other work must remain on schedule.

After all, we must have the changes working by January 1, 2000. Unlike other computer outages, with which we are all familiar, you can't simply buy a new piece of hardware or hire an expert to get the system running again. If your system doesn't work, it is not likely to work for a long time.

Scope of the Problem

The problem exists for all of the mainframe computers and personal computers (PCs) in use throughout SSA. All the PC-based codes used in our regional offices and Program Service Centers must be examined. In addition, if any employees have written programs currently in use, the programs must be examined to determine if any changes are required. We will also need to determine when commercial software products which we use will be Year 2000-compliant.

Tools Available to Help

Although there is no automated solution, there are tools available that will help with this problem. We purchased one of these, the VIA/ALLIANCE software product from VIASOFT, in June 1995. This product helps identify dates in our computer system and tracks their flow as they are moved from field to field. We have already conducted training sessions on the use of this tool, and are in the process of using it to help us identify date fields in our programs. Use of this tool will also help with estimating resources needed to complete the project.

In addition to the newly-purchased software product, our

repository which houses all of our software, ENDEVOR (Environment
for Development and Operations), is equipped with its own
scanning tool, which helps us focus on those areas in the code
most likely to contain dates. While neither of these tools avoid
the necessity of looking at every line, they will make the
analysis phase of this project quicker and easier.

Other Areas Affected

The conversion to a system which can handle 21st century dates
affects more than lines of computer code. Many forms currently
in use have a preprinted "19" prefix in showing dates. Since
preprinted forms require a long time to be revised, they must be
changed as early as possible. Also, the computer screens that
our employees see display only two-digit dates. Because the
screens themselves are full, changing the dates to display a
four-digit date would involve redesigning screens and the order
in which data are displayed. As a result, we decided to continue
to show two-digit years on the screens and use an algorithm to
determine which century applies. We will redesign only those
screens where the century cannot be determined.

Interagency Activities

I would like to briefly mention that the Office of Management and
Budget asked SSA last year to lead interagency discussions
designed to increase awareness of the Year 2000 issue and
encourage a sense of urgency concerning the changes that will be
needed. The Year 2000 Interagency Committee Chairperson is
Kathleen Adams, Associate Commissioner for Software Design and
Development, SSA. The Committee began meeting in November 1995
with only a few representatives attending, but the number has
grown to more than 20 participants, and the number grows with
every meeting.

It is important to keep in mind that each organization must find
solutions that meet its unique needs, and that there is no single
approach that all agencies can employ. The purpose of the
interagency committee is to discuss cross-cutting aspects of the
problem, such as interagency data exchanges and availability of
various vendor products. Furthermore, we believe that this group
is meeting its objective to raise awareness of this issue and to
encourage timely action. To this end, SSA and the Year 2000

Interagency Committee will be sponsoring a Year 2000 conference
for all Government agencies on May 2, 1996, in Washington, D.C.
Government agencies and private sector firms will share their
experiences and approaches for addressing the Year 2000 problem
in their organizations. Vendors that have Year 2000 solutions
will also be present to answer questions and distribute product
literature.

Conclusion

In conclusion, Mr. Chairman, it would be impossible to overstate
the importance of a smooth and timely transition of computer
operations to accommodate the need to reflect 4-digit years as we
enter the 21st century. There should be no question of what
needs to be accomplished over the next several years, and no
hesitancy in devoting the resources required to ensure timely
completion of the task. I can assure you that SSA will continue
to work to complete the project on time.

Mr. HORN. I take it you are giving the testimony officially for the administration and Ms. Adams will participate in the questioning. Does Ms. Adams have anything else to add?

Ms. ADAMS. I do not.

Mr. HORN. Let's proceed then with the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence. Mr. Paige has been a frequent witness before this committee, and we are always glad to see you again.

You have some of the major problems in this area. I have read your statement; I think it is an excellent statement and I look forward to your making the presentation.

Mr. PAIGE. Thank you very much, Mr. Chairman and members of the committee. I want to thank you for allowing me to testify before you today.

Let me assure you that the Department of Defense is very much aware of the potential that some of our systems will not properly process age beyond the year 2000. We consider it a very serious problem. In fact, we are handling it as a computer virus set to become active in the year 2000 and earlier in some cases.

Our ability to defend a nation affected by these year 2000 processing areas and the many hours that we are aggressively taking action to find a fix and set the year 2000-related problems in our systems. Indeed, we are placing priority on our weapon systems and systems that relate to safety. Fortunately, our weapons systems do much less processing than most automated information systems, but we can leave nothing to chance when we are dealing with the capabilities of our weapons systems.

Each of the military departments and defense agencies are working to implement year 2000 solutions in the systems for which they are responsible. We have support being rendered by the Defense Information Systems Agency, and my office is working to facilitate the sharing of information within the Department in the year 2000. Each of the three military departments and the two largest defense agencies have year 2000 pages to help get the word out on best practices, lessons learned, and the status.

Although there is no governmentwide policy related to the year 2000, the Defense Department has been actively participating in the Federal Interagency Year 2000 Committee. Some of our computer system year 2000 solutions have already been put in place; in others, the work has been planned in the normal operations and maintenance cycle and the majority of our systems we are still trying to identify where the year 2000 problems exist. Our initial assessment does indicate that we will be forced to reprogram significant funds to fix our application software and upgrade our hardware and associated systems software, which had not been anticipated.

There is a lot of work to be done and we are faced with limited resources and a due date that cannot be changed. While the year 2000 problem may be on a case-by-case basis, it is largely a trivial technological problem. We need to roll up our sleeves and get on with getting the work done now, not analyze and assess our systems in the year 2000 to the point we do not have enough time left to do the work.

Again, Mr. Chairman, I thank you for the opportunity to present the Department's view on this problem, and I appreciate you bringing it to the public's attention.

Mr. HORN. Thank you very much, Mr. Secretary.

[The prepared statement of Mr. Paige follows:]

STATEMENT BY

THE HONORABLE EMMETT PAIGE, JR.

ASSISTANT SECRETARY OF DEFENSE

(COMMAND, CONTROL, COMMUNICATIONS AND INTELLIGENCE)

BEFORE THE

COMMITTEE ON GOVERNMENT REFORM AND OVERSIGHT

SUBCOMMITTEE ON GOVERNMENT MANAGEMENT, INFORMATION AND TECHNOLOGY

UNITED STATES HOUSE OF REPRESENTATIVES

APRIL 16, 1996

Mr. Chairman and members of the Committee, it is a pleasure to testify on behalf of the Department of Defense before your Committee on the ability of public sector computer systems to properly process dates in the Year 2000. The Department of Defense is very much aware of this serious problem and we are treating it much as we would a computer virus.

In the Department of Defense we are dramatically raising the awareness of the Year 2000 problem across the board -- from the Department's senior leadership to its systems personnel and its suppliers in the commercial sector. We have set in motion a campaign to find and fix the problem in our weapon systems and automated business information systems. We are also working with other Federal agencies and private industry to increase awareness and solve this ubiquitous problem. I will limit my remarks to what we in the Department of Defense believe is the magnitude of the Year 2000 problem and the urgency with which we must fix this problem.

Once identified within a system, the Year 2000 problem is usually trivial to solve, technically. However, it is an enormous management problem. The Department has an inventory of

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thousands of systems and hundreds of millions of lines of computer code. Finding, fixing, and testing date-related processing in our systems will require significant resources, resources that generally have not been planned or programmed for this purpose. We face a firm deadline and there is no "silver bullet" product in the marketplace to find, fix, and test all the changes required.

The impact of taking no action on the Year 2000 problem is that we risk the high probability of severely hampering, in some cases, many Defense activities. Some of those activities will involve military operations. Does this place some of these operations at risk? I believe that it does.

As a society, we in this country have become dependent on computers. We have fundamentally restructured our institutions over many years to exploit computing and telecommunications technologies. The Department of Defense reflects these institutional changes. We are dependent on our computer and telecommunication systems.

If a particular system fails, we have generally learned how to work around an individual failure. However, if a problem, that happens to be common in most of our systems, were to cause failures in all of those systems at the same instant, the consequences might be catastrophic. The Year 2000 problem has these characteristics.

If our personnel and payroll systems process dates incorrectly, current employees, members of the Armed Services, and our annuitants cannot be properly paid. If our logistics and transportation systems process dates incorrectly, people and equipment can not be delivered to the correct place at the correct time. This, of course, could have catastrophic consequences should it happen during a time when our fighting forces are being called upon to react to national security crisis or lend emergency assistance. Some of our weapons systems would not function properly. Our databases would be greatly corrupted.

Inaction is simply unacceptable; coordinated and collaborative action is imperative. We have taken action to address the Year 2000 issue, and we will continue to take action. We are placing particular emphasis on our weapons systems and on systems related to safety. Fortunately, weapons systems are, for the most part, much less date-intensive than most business information systems so there are fewer Year 2000 fixes which need to be made in them. Nevertheless, we still have to check all weapon systems for the Year 2000 problem. When we are dealing

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with weapons and their delivery systems, we must leave nothing to chance.

We are implementing Year 2000 solutions in each of the Military Departments and Defense Agencies. The Military Departments and Defense Agencies are assessing the impact of the Year 2000 problem and prioritizing the needed work on the systems for which they are responsible. My office is working to facilitate the sharing of Year 2000 information; such as lessons learned, best practices, and status of activities. We must avoid duplication of effort as much as possible.

Each of the three Military Departments and our two largest Defense Agencies have established Year 2000 Home Pages on the World-Wide Web. These Home Pages are "hot-linked" to one another. We are adding Year 2000 information to our systems inventory database so that we can better manage the interface changes that will occur related to the Year 2000. The Defense information technology community is very much aware of the Year 2000 date problems. We are continuing to raise the level of awareness of our customers -- who are senior leadership in the functional areas within DoD, such as logistics, personnel and procurement, and the entire warfighting community.

The Department of Defense has some relatively unique Year 2000 problems. Our software inventory includes software written in computer languages, such as the language Jovial, that are not widely used elsewhere. This is a legacy of past policies that permitted the proliferation of different computer languages and dialects. While we are working aggressively toward correcting the language problem, we must also deal with the consequences of having so many computer languages to deal with. This means that we will need a wider array of software tools to help reduce the time to find and fix Year 2000 problems, and to validate the solutions through testing. Commercial off-the-shelf software tools are available only for some of the more commonly used computer programming languages, such as COBOL, C, and, of course, Ada. For many computer languages, no commercial tools are available.

Another problem is that we may find the Year 2000 date problem in computer chips used only by the Department of Defense. Those chips may no longer be in production. Some of these chips are because of special military requirements, such as in a missile. Others of these are part of the legacy of past policies that allowed broad use of military-unique specifications rather than encouraging the use of commercial, nondevelopmental items. Secretary Perry and Deputy Secretary White are firm in their

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support of the use of commercial products, but DoD must still deal with its inventory of DoD-unique computer hardware components.

Although there is as yet no government-wide Year 2000 computer policy, the Department of Defense has been actively participating in the Federal Interagency Year 2000 Committee. We have made several recommendations that are being acted upon to help the Federal sector address Year 2000 problems. We are encouraged by the work of the Office of Management and Budget (OMB) in dealing aggressively with the private sector to urge them to make their products capable of properly processing dates in the Year 2000 and acknowledging which products will not be able to process dates in the Year 2000. Central leadership and coordination by OMB will relieve Federal agencies of potentially duplicating effort in dealing with the commercial hardware and software vendors. Addressing this problem will drain plenty enough resources without having it magnified by duplication of efforts.

We have implemented Year 2000 solutions in some of our systems, already. In other systems, we are planning the work as part of the normal operations and maintenance (O&M) cycle. As far as what is possible or should be possible, solutions are being found by the DoD's central design activities as a normal part their O&M activities. The Services and Defense Agencies must prioritize their work efforts to get the most critical things done within the resources available. For example, the Defense Finance and Accounting Service has been working this problem for a number of years. However, for the majority of the Department of Defense systems, we are still assessing where Year 2000 problems exist and determining the resources required to solve those problems.

We believe we will have to expend significant funds to complete the task. We are working diligently to quickly refine our assessments across the Department. However, it is becoming clear that trade-offs will be required. In some cases, there will be an adverse impact on planned system improvements. The implementation of many business process reengineering initiatives may need to be delayed, since many of these are reliant upon the use of information technologies. With resources for the Federal government becoming increasingly scarce, DoD will continue to examine its priorities carefully when considering funding for information technology investments, including those for the Services and Defense Agencies to fix or remedy the Year 2000 problem. We must work within the constraints of overall budget realities.

The resource requirements to implement Year 2000 solutions extends beyond application software and DoD-unique hardware. The Department of Defense and other Federal agencies have not anticipated the requirement to purchase Year 2000 compliant hardware and software. Much hardware and systems software must be replaced or upgraded, including the majority of hundreds of thousands of personal computers.

I am increasingly concerned about the effect of the Year 2000 problem within our personal computers and workstations. In this arena, we, along with the rest of the nation, are operating within the control of hardware and software industries. In many ways, I am more concerned about the "bugs" I am not able to fix or help to fix. If some significant percentage of our off-the-shelf inventory of small computers and their software should fail, we will have an enormous, costly, and potentially perilous situation on our hands. This problem needs to be worked immediately.

The management aspects associated with the Year 2000 are a real concern. With our global economy and the vast electronic exchange of information among our systems and databases, the timing of coordinated changes in date formats is critical. Much dialogue will need to occur in order to prevent a "fix" in one system from causing another system to "crash." If a system fails to properly process information, the result could be the corruption of other databases, extending perhaps to databases in other government agencies or countries. Again, inaction is simply unacceptable; coordinated action is imperative.

In summary, there is much work to be done, and much needed coordination among those doing the work. We have limited resources and an immovable deadline. There can be no schedule delays. Significant resources will likely be required to find, fix, and test date-related processing in our thousands of systems and hundreds of millions of lines of code. We must establish priorities for our efforts. We need to get on with isolating Year 2000 problems and fixing those problems, now. We cannot spend an inordinate amount of time analyzing and assessing the problem; we do not have the time.

Mr. Chairman, I thank you for the opportunity to present the Department's views on this important issue.

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Mr. HORN. Our last witness on this panel is the Honorable George Muñoz, the Assistant Secretary for Management and Chief Financial Officer, Department of the Treasury.

Mr. Muñoz.

Mr. MUÑOZ. Thank you, Mr. Chairman, for taking leadership in this very important subject matter. You should be applauded for bringing this to the attention of all Federal agencies, as well as the private sector.

I would like to also applaud the efforts of OMB for having taken the initiative to sponsor the Interagency Committee, as well as give credit to the GSA in this for developing recommended guidelines and standards. I also would like to thank the Treasury Bureau— information technology officers of the Treasury Department and the Office of Information Systems and the Office of Security for having identified the issues in our Department and for assisting in this testimony.

Mr. Chairman, we looked at this problem and dissected it into three parts for purposes of this testimony. The written testimony goes into the severity of the problem, which I will not discuss in my oral testimony because of excellent presentations that have been made prior to this testimony on the subject matter. I think you understand the severity of it.

Second, we are analyzing the Government environment that is unique to our Federal agency and how we are trying to solve this problem.

And last, we would like to identify some of the lessons that we have learned, some of the opportunities that exist, and some recommendations for this body.

First, on the Government environment, we have to recognize that in the Federal Government we have a huge inventory of legacy software and hardware. Much of it comes from the unique missions that our agencies have. These have complex systems and interrelationships with hardware that perhaps because of their age may no longer be supported or because the vendors are out of business.

I brought with me, Mr. Chairman, three charts that are here to my left that give an example of this situation. These charts help illustrate the significant role that legacy systems play in Federal automation.

The charts display the average age of computer hardware used by a wide variety of agencies. These charts are based on information submitted by agencies to the GSA as of September 1995. The blue bars represent the number of computers included and the average age calculations that are shown are shown in orange.

I would like to refer to the first chart, which is the one to my extreme right, that is referred to as "large computers." This first chart describes a utilization of high-speed, general-purpose, and scientific computers with average system values generally in excess of $1 million.

The medium computers, which is the second chart, shows the age of Federal medium computers, which include traditional super-miniclass computers and small mainframes, with prices ranging from $100,000 to $1 million.

And the last chart is for small computers, usually supporting 2 to 32 users, that typically range in the cost from $10,000 to $100,000.

If one looks at these charts, you may say that if anything is more than a decade old, it is very suspect. Then you can just draw a line in terms of the age and look at the agencies that have those computers. They are going to be looked at with suspect. However, as earlier testimony was made, even a computer that was acquired 18 months ago—if its program, its core program was merely bridged over to current software it may also be suspect and has to be looked at.

Mr. HORN. Before you leave those charts, let me ask a few questions just to get something straight.

I notice the Navy is separately identified, the Department of Defense then comes next. Does the Department of Defense figure include Army, U.S. Air Force, whatever, or how are we setting the charts up? Or is this just a selective number of departments and has no relationship to the total problem? That's what I am trying to get at.

Mr. MUÑOZ. The Department of Defense chart includes all, but we dissected it as the Navy only because of its unique numbers.

Mr. PAIGE. They are still part of the Department of Defense.

Mr. MUÑOZ. There was just one element in our Federal environment.

Another that I would like to point out to you is the dwindling pool of experienced personnel. Because of the downsizing and retirement that we have had in our Government, it is possible that some agencies may have lost some talent—that was around in the '60's or '70's when many of our homegrown computers and programs were being established—so that is some consideration that we have to take into account.

Another is the acquisition cycles. As you know, sir, you have worked very hard in freeing us up from the shackles of some of our procurement processes that have taken a long time.

Last, because of the way we work or budget cycles, there is a long lead time for addressing these kinds of problems. Treasury has played a very proactive role in this. I can assure this subcommittee that Treasury has already put in motion all of its measures to identify where problems lie and what needs to be done. Our largest bureau, which is the Internal Revenue Service, already has a blueprint for addressing this problem, and we are quite confident in its blueprint as it targets having a full transition by the end of 1998. That will, in fact, be met. The testimony—written testimony—goes into further detail in terms of how Treasury has responded to this.

I would like to conclude by outlining some lessons that we have learned from Treasury's own experience, as well as our discussion with business leaders and State governments and universities that have wrestled with this problem. I would like to point out four items.

First, planning is paramount. There must be some strategic approach to this problem. We should not look at it as merely trying to convert two digits into four digits.

Second, good project management is essential. It is what we have, and an analogy is, it is like repairing a plane while it is in flight; that is, many of our operations will have to continue while we are doing the conversions and testing them.

Next, we think it is going to be more costly than expected. The cost estimates seem to increase. A year ago initial projections were that less than 50 cents per line of code would be the cost. Today, it is estimated it may be from $1 to $2 per line. Even this number primarily reflects conversion costs and may not include testing the hardware and having replacements or upgrades.

We also want to point out that testing is the key; the actual effort of converting may only be 10 to 20 percent of your effort. Planning in terms of what to do should take about 25 to 30 percent of the effort.

And last and most important, testing, testing, testing—testing to make sure, in fact, the conversion is effective and we have not broken something that was, in fact, not broken before. We expect that testing will take anywhere from 45 to 55 percent of our total effort.

There are good solutions and bad solutions. Anyone who promises to quickly and cheaply fix the problem is offering a silver bullet, and clearly that is something that doesn't exist and is not doing us any favors. Successful conversion will require the functional and technical stewardship of the individual Government owners. We think that agencies should perform their own solutions. It is key to the success that converters must know the systems, and each department and agency internally has the best perspective on what should be done.

Last, the chain is only as strong as its weakest link. We think that not only some agencies should address this in a serious fashion, but all agencies—and not only those in Federal Government, but those outside the Federal Government because data is interchangeable.

We would like to conclude by saying there is some opportunity for this committee. When all of our agencies go through this process, we think we can end up with an improved inventory of our hardware and software. Because of the cost-benefit analysis, we may in fact improve our utilization of data so we can meet demands of this Congress such as the GPRA demands that we have better and more useful information for users.

Last, we think that this is an opportunity for us to leverage our tools, expertise and best practices.

In terms of next steps, we think that the OMB Interagency Committee is a good start; it is a good example of what needs to be done. It should be expanded to include all agencies. It should be chartered formally and provide a forum for exchanging information and making 2000 recommendations.

Last, from Congress we would like to have the Federal community assisted by this committee announcing this problem and bringing it to the attention of all of the relevant parties. We think that it is critical that when Congress considers legislation that it take into account that all agencies are going to be going through this transition; and last, as budgets are being considered, that this element is also taken into account.

I thank you, Mr. Chairman, for allowing me the opportunity to testify for the Treasury.

[The prepared statement of Mr. Munōz follows:]

George Muñoz
Assistant Secretary (Management)
& Chief Financial Officer
Department of the Treasury

Introduction

Representative Horn, distinguished members of the Committee, ladies and gentlemen. On behalf of the Department of the Treasury and Secretary Rubin, I want to thank you for the opportunity to speak with you about the Year 2000 Date Transition, more commonly known now as the Y2K problem.

I want to commend Representative Horn and this Committee for taking the leadership to bring this important issue before Congress. As you have heard from the other witnesses in this hearing, it is essential that the Federal government begin defining the government solution for the century date change and, by drawing attention to it at this level, much needed resources can be focused on that process.

I would also like to applaud OMB for having taken the initiative to sponsor the Interagency Committee work that has recently begun. GSA and NIST are also to be commended for their part in developing recommended guidelines and standards.

Credit is also due to those agencies like Social Security and Department of Defense which have demonstrated foresight in initiating projects within their own departments. I also want to recognize the Financial Systems Committee of the Chief Financial Officers Council (CFO) for their leadership in this effort. In addition, I would like to thank the Treasury Office of Security and the Office of Information Systems as well as our bureau information technology officers for having identified this issue and coordinated our response.

I plan to present here not only the position of Treasury, but, as Executive Vice Chair of the Chief Financial Officers Council, my comments will reflect information gathered from several state governments, Federal agencies, and the CFO Council's Financial Systems Committee.

My comments today will briefly address the three main components of the Year 2000 Date Transition:

- o The reality and severity of the problem;

- o The additional risks in the Federal environment and how we in Treasury are addressing the problem; and

- o Finally, lessons learned, opportunities, and recommendations for successfully moving into the 21st Century.

Severity of the Problem

A description of the problem here may be repetitive of what my colleagues have presented, but I would like to define the issue from the financial perspective. Clearly, if a solution were delayed, we would be courting disaster and may be facing chaos. That would not happen.

When I use the term "problem," I am referring to the challenges that I and many other managers have to assure that key systems will process smoothly into the next century. It is a challenge which we will meet. I am confident that systems in the Treasury Department and other agencies will work on January 1, 2000. As others have said, the challenge comes from the inability of some computer systems to process dates after 1999 accurately.

It is not a problem that is limited to either the Federal government or other public sector information systems. It is widespread throughout the public and private sector information systems, systems that impact our lives daily. It involves deeply embedded manipulations that have the potential to affect almost all automated systems, from small, single user systems, to massive transaction systems.

In reviewing the missions of our agencies, the effect of Federal government computer processing on the American economy becomes abundantly clear. For example, in the Treasury Department, we have large, extensively complex systems:

o   Treasury collects $1.4 trillion annually through IRS, Customs and ATF, representing over 97% of the total Federal revenues.   Last year, 250 million returns were processed.

o   The Treasury Financial Management Service (FMS) oversees a daily cash flow in excess of $10 billion and issues over 800 million payments totaling over $1 trillion each year for all executive agencies.

o   The Customs Service collects over $20 billion in duties, taxes, and fees.   They assist in the administration and enforcement of some 400 provisions of the law on behalf of more than 40 government agencies and process 456 million persons and 127 million conveyances a year.

o   Public Debt auctions $2 trillion marketable Treasury securities annually.   They issue and redeem 150 million savings bonds annually and they account for the $4.9 trillion Federal debt and over $300 billion in annual interest charges.

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I have described these key activities to provide you with a sense of diverse areas of potential impact and the magnitude of work needed to address these seemingly simple date problems. It is important to stress that the business of the Federal government is intricately interwoven with the commerce and welfare of the rest of this country as well as other nations. Because of those critical relationships, it is essential that we in the Federal government address the Year 2000 problem aggressively.

Before I go any further, I think it is important to address a question which naturally emerges from a cursory examination of this problem: "Did this problem arise because of someone's negligence?" To this, we emphatically respond: NO!!! Not many years ago, computers were not measured in gigabytes and terabytes, but in kilobytes. As is often quoted these days, people today have computers in their homes that have more storage space and processing capacity than many mainframes of thirty years ago.

In those days, saving storage space in computer files was critical to the efficient operation of systems that used very expensive resources. As a result, software was developed to solve complex technical problems and serve intricate, critical business needs using only two digits for the year. Many of those systems are still in use, which is a testimony to their quality but also, to the complexity and cost of migrating these systems to newer technology. These systems are central to many of our most critical operational functions--they are at the heart of the Year 2000 problem.

The enormous scope of this conversion effort is only clear when the steps involved locally within an organization are multiplied across the world-wide enterprise of information systems. Resolving Year 2000 issues will require extensive examination of applications, data items, and systems. While the legacy systems are the most likely to include the two-digit year, we must be sure that all dependencies have been identified and addressed.

For some Year 2000 compliant systems, complex interfaces will need to be built to handle data to and from systems that may or may not be compliant yet. Typical of most organizations, within the portfolio of Treasury production systems, not all systems will be updated at one time, requiring complex configuration management as sections of code are made compliant.

Bridges will have to be built between systems as changes are introduced. Firewalls and other protections will need to be developed as part of contingency plans to ensure the success of critical system if interfaces fail. Comprehensive test environments will have to be built to ensure that applications can successfully process 21st century dates.

Finally, all of this must be accomplished while still operating these systems for critical production activities.

Government Environment

As we prepare to address this issue, it is important to recognize the realities of the environment in which these conversion activities will take place in the Federal government. Many Federal systems are larger and older, and perform unique tasks so they are less likely to be included in the Year 2000 upgrades provided by vendors. Simply put, our challenge is greater than that faced by the private sector.

In addition, there are some obstacles to resolution of the problem, which hinder, rather than support, the technical and project management efforts to move the Federal Sector forward toward full compliance. Those obstacles include the limitations of the acquisition cycles, dwindling pool of experienced personnel, application systems unique to the Federal sector, and a huge inventory of legacy software and hardware. Further, as opportunities to cut expenditures are sought, the budget environment may limit aggressive conversion activity in favor of continuing current operations.

Given the size of this effort for the Federal government, sufficient quantities of competent vendor support services are absolutely essential. There will be fierce competition for technical contracting services to assist public and private organizations world-wide with this conversion effort. The longer the Federal government agencies wait to purchase these services the higher the costs and the more likely all competent sources will already be fully committed. In this regard, the recently enacted Information Technology Management Reform Act of 1996 should help immensely to provide flexibility in acquiring the needed technology and systems.

Personnel issues are another category of Federal government difficulty. Work on this problem is occurring at the time of downsizing the Federal workforce. We must be careful as we downsize to maintain the critical expertise we will need to address this Year 2000 problem.

One of the most significant features of the government environment is the huge inventory of legacy software. Many times that software is characterized as being monstrously complex and run on outdated hardware. As can be seen from the attached charts, the Federal government has large numbers of older mainframe systems which may be suspect. For many of these legacy systems, the vendors who originally provided the software are either no longer in business or not upgrading these early versions of their products. Funds may be required to upgrade or replace that software, in order to ensure the continuing operation of systems.

Finally, the testing environment for implementing the solution may require duplicate resources for a limited period of time. There has never been a time when so much code was being examined, changed and tested at the same time. Not only will most of the

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software in each agency be changing, but simultaneously, most of the code in every other interfacing agency will also be changing. The rigorous testing environments required to implement such a complex scenario will require careful planning.

Budget cycles for purchasing much needed services, software, and hardware require extensive multi-year projections and must be submitted months and years in advance. It may be difficult to finance a conversion effort of this magnitude within existing program funds.

Treasury Year 2000 Initiatives

As I stated earlier, Treasury's systems will not fail at the beginning of the next century. To ensure that, we have already begun necessary steps to address the Year 2000 issue. Every bureau within Treasury has made progress towards the Year 2000 solution and some have made significant progress within their information systems in resolving the Year 2000 problem.

o The Department has been an active participant in the OMB Interagency Year 2000 Committee since its beginning in December 1995.

o A Treasury-wide group has been established to highlight the problems, work the issues, and share lessons learned.

o Milestones have been given to bureau information technology executives which will provide a vehicle by which the Department can track progress.

o The bureaus are at various levels of progress. Some bureaus have completed one or more of the following key steps in the Year 2000 conversion process:
   - used four-digit year fields for many years;
   - completed conversions for legacy applications;
   - developed blueprints;
   - inventoried systems;
   - evaluated tools; or
   - identified potential systems at risk..

o The bureaus have been requested to include estimated Year 2000 costs in the FY 1998 budget submissions.

o Our Chief Financial Officers are aware of the issue and are monitoring the compliance of fiscal systems across Treasury.

Lessons Learned

Turning now to what can be done, I would like to discuss the lessons that have been learned, the opportunities that we have for making improvements, and how Congress can proactively address the Year 2000 problem.

No silver bullet. There is no one solution for all situations because of the inherent complexities. Huge legacy systems are full of homegrown routines, adapted for specific agency requirements, many of which have dates. There is no way a quick fix or new product can address all of the embedded date usage. The only solution is addressing each technical problem internally and coordinating the project centrally.

Planning is paramount. The temptation to rush in and attack the technical problem is great, especially with the added pressure of the inflexible deadline. This would be a huge mistake. Planning is essential because approaching a project of this size must be done strategically and tactically. Thinking outside the box may give us the chance to evaluate opportunities to improve business processes and computer processing. Taking the additional time to plan is imperative and will prevent costly errors later, when there will be no time to recover.

Good project management is essential. The challenge of project management in an effort of this size is unprecedented in the information systems environment. This is not strictly, or even primarily, a technical problem. Treasury's financial systems, especially those related to revenue collection and disbursement of funds, represent the crossroads of financial activity for the Federal government. Consequently while addressing the Year 2000 issue, Treasury must also ensure that the integrity of all existing financial systems is maintained during this conversion. We cannot off-load these processes while we make corrections to them. It is analogous to trying to repair a Boeing 747 while in flight. Managing all of the components simultaneously while continuing to execute the mission is absolutely imperative.

More effort than expected. Planning and testing, which are critical to success in this effort, are requiring significantly more resources than expected. Neither the government nor industry has ever attacked a computer systems problem this massive or pervasive. The brittle nature of the homegrown systems, the monumental coordination with external agencies, the heterogeneous existing technical environment all contribute to the complexity, and therefore to the effort, of this project.

More costly than expected. As the effort was underestimated, so was the cost. Because of all the elements that must be brought to bear (planning, testing, project management, unexpected hardware and software upgrades) cost estimates continue to rise. And, as increasing numbers vie for the same limited number of service providers, rates may

escalate as well. A year ago initial projections indicated that anticipated costs would be less than $.50 per line of code. Today, current industry metrics reflect that estimates have risen to $1 - 2 per line. Even this number primarily reflects conversion costs and may not include testing, hardware replacements, and systems software upgrades.

Testing is the key According to industry estimates, the actual conversion may represent only 10 -20% of the total effort. The critical component, testing, will actually consume most of the resources: 45 - 55% of the total effort. With so much of the code being modified, we must verify that, in the process, we do not break something that was not broken. Certifying those changes will be essential to continuing our normal processes. The remaining 25 - 35% is accounted for with required planning.

Standards facilitate process. A recommended standard for data exchange was developed by NIST and endorsed by the OMB Interagency Committee recently. Such standards will help to create much needed common ground for project coordination and data exchange between government agencies and the business community.

Good solutions - Bad solutions. There are several ways to approach this project. Anyone who promises to quickly and cheaply fix the problem is offering a "silver bullet" and clearly is not doing us a favor. The Year 2000 problem emerges from the context of the technical and organizational environment in which it was created and in which it resides. And it will require the functional and technical stewardship of the individual government owners to correct it.

Allow agencies to perform their own solutions. The key to success is that the converters must know the systems. Each department and agency internally has the best perspective on what should be done to resolve the technical issues. In-house expertise is your best expertise.

Chain is only as strong as its weakest link. Government agencies and the business community continually exchange data, creating intricate interdependencies. Those interdependencies create potential weaknesses that are not related to the internal health of systems, but to those external groups upon which certain processes and business functions are dependent. Firewalls can be built to protect each agency's information assets, and that covers the possibility of unconverted data. But if their systems fail and data is not available, contingency plans are needed.

Opportunities -- Silver Lining

Coming Out Ahead. If we address these problems correctly, some significant benefits can come out of the effort. We will not only ensure survival but also improve practices.

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Specifically, we will end up with a more complete, accurate and usable inventory of hardware and software assets; a comprehensive evaluation of our capabilities; relevant metrics and measures; streamlined project management practices; and the technical infrastructure to improve tracking, accounting and transitioning. This information is what was envisioned under the Government Performance and Results Act in terms of well-defined outcomes and performance measures, resulting in better service.

Leveraging Government Resources. An immediate benefit of multiple agencies working together is the opportunity to leverage tools, expertise, and best practices. Already, OMB's Interagency Committee has put a website in place to facilitate the exchange of best practices and project experience (http://www.itpolicy.gsa.gov). Software routines that have been developed for the government have also been exchanged. The development of common approaches and standards will benefit the government by using common resources to build benchmarking frameworks and to encourage franchise funds for sharing products and deliverables.

Next Steps

Expand OMB Year 2000 Interagency Committee. OMB has demonstrated leadership in establishing the Year 2000 Interagency Committee to provide a forum for exchanging information and making Year 2000 recommendations. This Committee should be expanded to include all agencies and formally chartered. While each agency would be responsible for ensuring Year 2000 compliance for its information systems, the Committee could provide high-level direction to agencies for resolving the Year 2000 problem. Its responsibilities would include the development and communication of Year 2000 data exchange, contracting, and software procurement guidelines. Likewise, the Committee would facilitate the exchange of strategies, best practices and resources across the government.

As a first order of priority, each agency must assess its own systems for vulnerability to the Year 2000 problem, decide which of the systems to convert, prioritize its application inventory, and prepare a Year 2000 conversion project plan. As part of its prioritization, each agency must, with a very critical eye, identify which systems will be upgraded, what solutions will be employed, and which systems will be replaced. This battlefield triage is absolutely necessary to protecting the most vital systems from failure.

Support from Congress. Congress can assist the Federal community by understanding the enormity of this challenge. I commend you, Representative Horn, and your Committee for having taken leadership in promoting Year 2000 awareness. An increased awareness of these issues will be critical when considering legislative requirements that will result in new tasks that affect information systems. In addition, understanding these issues will

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be essential as budgets are being considered. In fact, financial resources are needed to address all the tasks discussed in the testimony heard today.

I would like to thank this Committee for the opportunity to speak to this issue which is so important to our financial and Federal community.

Average Age and Quantity of Large Computers

(Over $1,000,000) - FY 1995
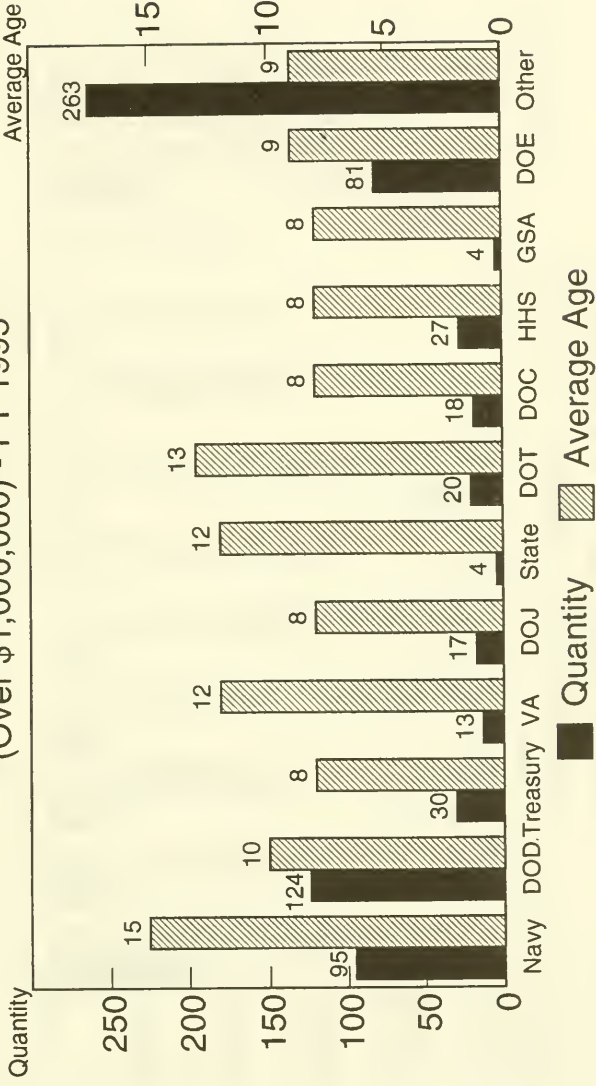
Source: GSA ADPE/DS as of 9/30/95

Average Age and Quantity of Medium Computers

($100,000 to $1,000,000) - FY 1995

Quantity

5,000	15
4,000	10
3,000	5
2,000	0
1,000	
0	

Average Age

Agency	Quantity	Average Age
Navy	1,632	13
DOD	437	11
Treasury	318	9
VA	236	8
DOJ	229	18
State	178	12
DOT	97	12
DOC	83	10
HHS	72	9
GSA	17	8
DOE	982	13
Other	3,486	11

■ Quantity   ▨ Average Age
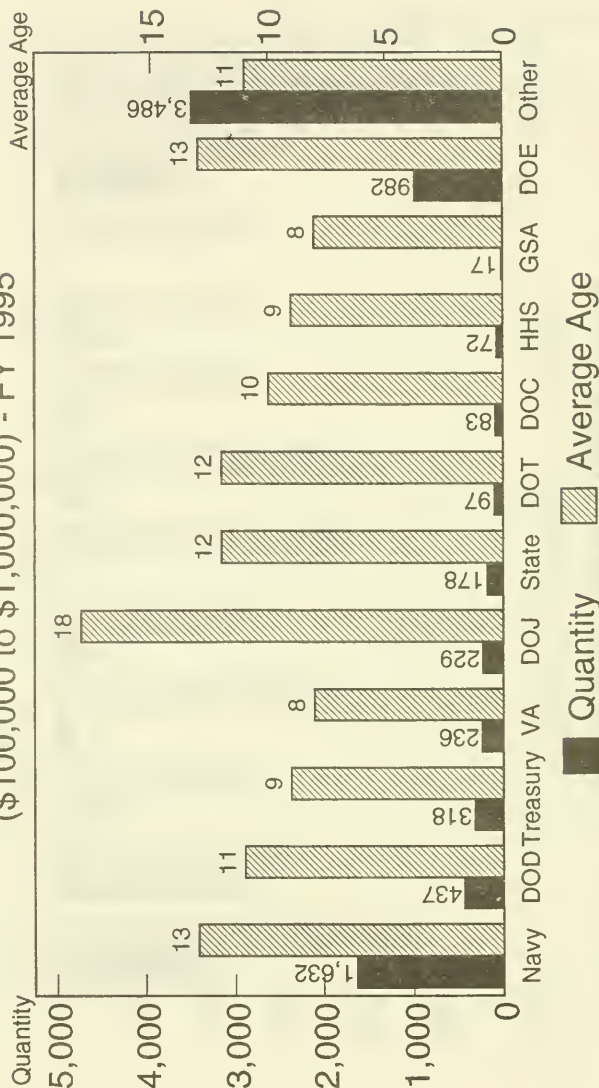
Source: GSA ADPE/DS as of 9/30/95

Average Age and Quantity of Small Computers

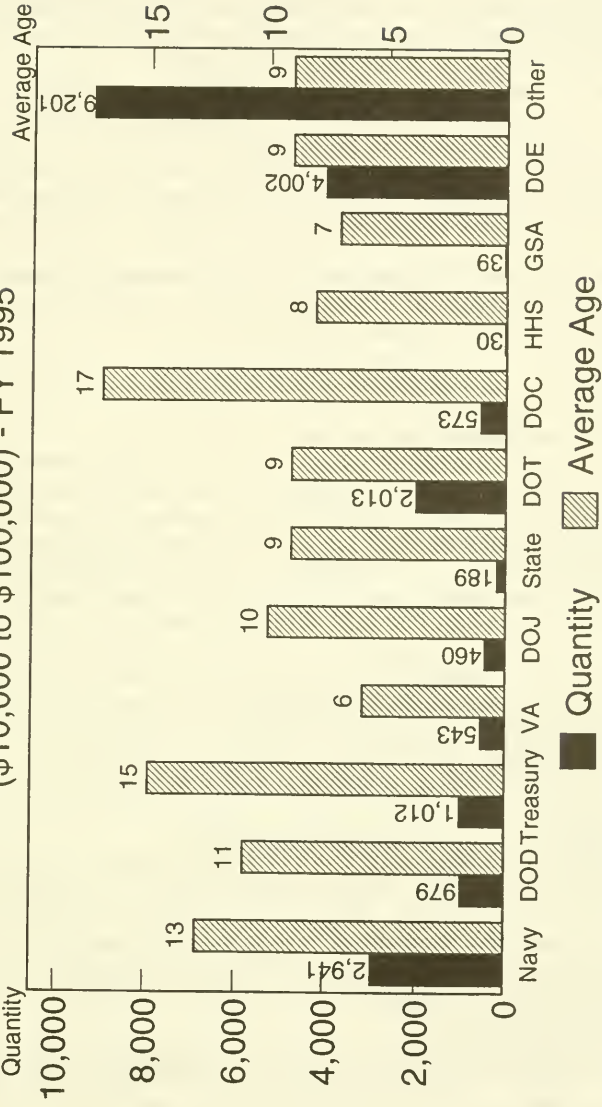($10,000 to $100,000) - FY 1995

Source: GSA ADPE/DS as of 9/30/95

Mr. HORN. Those are well-chosen comments that all three of you have had and certainly we congratulate the Social Security Administration for being on this problem since 1989; and you clearly are confident you will solve the problems by 1998.

Let me go back to some comments Mr. Paige made. I notice on page 6 of your statement you noted you are increasingly concerned about the effect of the year 2000 problem within our personal computers; and our work stations in this arena, along with the rest of the Nation, are operating within the control of hardware and software industries. In many ways, I am more concerned about the bugs I am not able to fix or help to fix. If some significant percentage of our off-the-shelf inventory of small computers and their software should fail, we will have an enormous costly, potentially perilous situation on our hands. This problem needs to be worked on immediately.

You referred in your testimony to a number of problems. I would just like you to elaborate on some of the ones you see that would be helpful to others to face up to.

Mr. PAIGE. As you probably know, we in the Defense Department depend on PC's and a lot of work stations; and today about 75 percent of those PC's and work stations, I am told, will flunk a test in terms of whether or not they will function in the year 2000. And with that in mind, we decided that we have to identify—start identifying those terminals and work stations real fast and come up with quick means—quick and effective means to correct the problem.

In some cases, it might mean that we will have to scrap the computers. But it is certainly, to me, the most important issue because all of the weapons systems and most of your mission-critical systems today are using PC's and workstations widely.

Mr. HORN. Any other problems, besides that one, in particular? That's a big one, but——

Mr. PAIGE. To me, that's most important.

Mr. HORN. In a sense, all the testimony has said—several panelists, this one as well as the proceeding one—our problem has been that we are too optimistic, because in the past, technology has been ahead of where we thought it might be and has taken care of us. But now technology is not ahead in this area and there is no silver bullet, as has been admitted by several witnesses, if anyone was even trying to seek one.

So I am open to suggestions on the management side of what needs to be done within the Federal Government to get other agencies that might not have focused as deeply as the three represented here have done.

I think it is very helpful that the Chief Financial Officers are working on this situation, and the Chief Information Officers, as they are placed. I don't think we have placed too many yet, or have we?

Mr. MUÑOZ. I don't believe they have all been designated.

Mr. HORN. We need to work on that, and I just wonder when I look at the membership—and, Ms. Adams, this applies to you—I notice that some of the agencies that I expected to be involved in your Interagency Year 2000 Committee, such as the Federal Aviation Administration—a major user of computers, very important in

the lives of most citizens of this country in terms of the takeoff, and the arrival of airplanes—the National Aeronautics and Space Administration; the Departments of Energy, Labor, Interior, Housing and Urban Development, they are not on the Year 2000 Interagency Committee.

Is there a reason why they are not on?

Ms. ADAMS. Yes. Let me just preface my comments. Just because someone is not represented on the Committee doesn't mean they are not working on the problem. Having said that, we do have the goal to reach out to all agencies and bring them into the Committee.

We are raising awareness. We are having a conference that is going to be on May 2. It will be open to all Government agencies. We have kept the price very low—the price is $25—given the fact that a lot of agencies don't have high budgets. We are hoping to reach out and have representatives from all the agencies there, and there will be information there on how to join the Committee at that conference, and we are targeting a lot of our awareness efforts at that conference.

In addition, the Office of Management and Budget has recently sent out two memos to heads of agencies and CIO's making them aware of the year 2000 problem, informing them of the Committee with the reference that they can call me to join and suggesting that they take an active role and let OMB know that they have plans to fix this problem.

So we have started by working it informally. I think we've made a lot of strides; in the last few months, we have really come together. In November, as Mr. Mesterharm mentioned, this effort was started by OMB, asking us to champion this cause. It was our idea to put the Committee together, and we have grown quite rapidly. I have gathered that there has been a lot of press attention and a lot of action and interest in this subject, but our goal is absolutely, as you state, to make sure we have all the agencies represented, because it is a very good forum to exchange information and not recreate the wheel all over, but to learn from each other as we move ahead.

Mr. HORN. One important point was mentioned by Secretary Muñoz, that I think we should talk about. This is the degree to which the agencies have prepared an estimate of some sort as how fiscally they will deal with this problem and how, in terms of number of personnel slots they will get down to the nitty-gritty of dealing with this problem.

I mentioned earlier that my understanding is that in the initial stage of the fiscal 1998 budget, OMB is starting to have some questions. I don't know if that's been confused with the nice, friendly, social notices that you have sent out. OMB has encouraged your Committee to act in this area.

I am just interested in, is there a sense of organization and analysis in getting the financial numbers, resolution numbers, getting people within these organizations or some other system so we know they are getting toward a solution in some timely way.

Ms. ADAMS. I didn't mean to imply that OMB's note to the agencies was a social invitation. It tells them to make sure they know

of the problem and write back and make sure they have a plan in place to fix it, in addition to——

Mr. HORN. How will that be reviewed?

Ms. ADAMS. I don't know that. I could find out from OMB and submit something for the record.

Mr. HORN. Staff will ask the new Director to give us—we might hold a separate hearing on that, where are they. That is the overall regulating agency in the Federal Government of in this area.

Ms. ADAMS. I think they are very aware of that role and concern for it.

Mr. HORN. If they are waiting until fiscal year 1998, I think they are waiting too long. I think they ought to request reprogramming authority in every agency that comes here. You don't need to pour new money into this; you just need to reallocate money that could be reallocated in any agency. If they can't find 3 or 4 percent; they need a new captain—officer heading it, or new under secretary or something. Anybody can find 3 or 4 or 5 percent in an agency budget. It doesn't necessarily need new money; it just needs to pinpoint that money and those human resources that money buys to deal with the problem in a timely way.

Ms. ADAMS. And the agencies need to make business decisions about that reprogramming.

Right now a lot of agencies are using their information technology dollars to increase productivity; a lot are going through downsizing while workloads are the same or going up. You see the agencies using those dollars to increase the productivity of the staff, to provide at least the same amount of services or better services. So they are going to have to make very, very hard decisions about what programs will not be forwarded and reprogrammed to take care of the year 2000 problem.

Many of the agencies have already started and are planning and are not waiting. I don't mean to imply that they are waiting until 1998 to estimate the cost. But what OMB is trying to do is come up with good estimates of what all the costs will be across Government; and I think the budget process works so far ahead that it is the 1998 budget that we are now all getting ready to look at, what those dollars are, but those programs will have to be in place way before 1998 if we are going to succeed.

Mr. HORN. It seems to me you and the members of your Committee who have the most experience with this in the Federal Government would be the ideal people to review these plans and advise the appropriate budget examiners and appropriate people on the information technology side and OMB, because you know what you went through; and it seems to me that experience ought to be shared Governmentwide.

Do we have any of that type of relationship that has so far been extended by OMB saying, We need you, we want to put you to work as a volunteer taking a look at those things?

Ms. ADAMS. As a matter of fact, at our last meeting Mr. Bruce McConnell from OMB came and talked to the Committee about OMB's concerns and how they want to do the estimate to give the people on the Committee a heads-up. Because most of the people on the Committee are the people in the agency that are working

this problem, they are aware, and many agencies have started trying to put a dollar figure on this.

As you can hear from Gartner and others, it is also very difficult to estimate what the ultimate costs of this are going to be. You need to determine whether you are going to do it in house or contract out; there are different costs involved.

Mr. HORN. One question before I yield to the ranking minority member, on the FAA, do we know what they are doing? They are not a member here.

Ms. ADAMS. They are not a member yet, but I do know they are working on the problem. I have talked to people at the FAA.

Mr. HORN. As you know, they have had computer situation, which, frankly, is a disaster area, and I know various people have tried to turn it around in the last few years.

When I was on a subcommittee in the 103d Congress and took a look at it, we knew we were in trouble. Everything was an add-on every day, and it seems to me I don't even know if they have discussed this thing in their computing program for this great wonderful machine that is being built somewhere in Washington. That worries me.

I now yield to the ranking minority member.

Mrs. MALONEY. Thank you very much.

Just to follow up on what you said, will the skies be safe in NASA? It's a very big question. Why are they not part of your Committee, and shouldn't you suggest that they become part and report to you on what they are doing?

Ms. ADAMS. I would defer to the FAA to tell the Committee what they are doing. I do not know. That does not mean they are not working.

As I said, I do know someone at FAA and talked to him about this, and he assured me FAA is working on it. They are not formally on the Committee. I suspect they will join.

Mrs. MALONEY. In this Congress we have had many conversations about returning power to the States, accountability empowerment to the States. My question is, what will happen to your systems if they are up and running and working very well, yet the States with whom you are interacting have not fixed their systems?

Mr. MESTERHARM. I can answer part of that. One of the major things that we started looking at a couple of years ago was data exchanges. We have a great number of data exchanges with all of the States, and of course the two-digit year is in that data that is being exchanged.

Mrs. MALONEY. Are they working on making a fix? Are they aware of this?

Mr. MESTERHARM. Obviously they are aware of it. Some States perform better than others, and obviously we are farther ahead with some than we are with others, but the States are working on it. We are working with them.

Mrs. MALONEY. Are you coordinating and working with them to make sure they are making appropriate fixes?

Mr. MESTERHARM. Appropriate fixes for our exchanges and work. Now what the States are doing with their own systems and everything else, I can't comment on that.

Mrs. MALONEY. Earlier today, Kevin Schick, one of the witnesses from the Gartner Group, estimated and predicted that 30 percent of the systems in place today will not be fixed by 2000 and that 30 percent will not be working, will not be fixed. And what is your fallback position, your contingency plan, for this project if it is not fixed, if there is 30 percent that is not fixed or even greater, and when do you make a decision whether or not to implement your fallback position?

But if his prediction is accurate, he is predicting by the year 2000, 30 percent of the system in the Government will not be working appropriately.

Mr. MUÑOZ. If I may respond, Treasury Department relies heavily on data that comes from the private sector, so it is a point of interest.

However, there are conversations that have been taking place for some time between, whether it is the Internal Revenue Service or the FMS [Financial Management Services] on this very issue.

Our fallback position is having fire walls that validate data coming in so that data, if in fact it is corrupted—in other words, non-functioning—that somehow it doesn't get into our systems. The Internal Revenue Service has identified that as part of its blueprint and does it in its normal mode of business.

Mrs. MALONEY. When was the last time—I would just like to ask the agencies, when was the last time you received a status report from the year 2000 project and that was in the report?

I am just asking Mr. Muñoz and Mr. Paige.

Mr. MUÑOZ. We have within Treasury an office which is in charge of information technology has an ongoing discussion with all of our bureaus. In fact, there was a forum. A consulate has been created, and we are constantly being given a status record report.

Some of our bureaus are way ahead of the game. They already have solved this because of their size and the complexities. Others have blueprints in place for converting.

Mr. PAIGE. Each of the military departments and defense agencies are at work doing their own thing. They are sensitized to the problem, and I have not and have really tried to preclude overcentralization, because with that comes expectations of additional resources.

I have emphasized to the military departments and agencies that their TOA will probably not be increased, that I want them, the people that are responsible, the owners of the system, to understand and know what problems they have, and I want them to take their responsibility to fix their systems, and that means reprogramming dollars from wherever they need to reprogram in order to take care of their systems.

With that ownership, I expect that they will select the systems they need to perform their mission, and hopefully, as you know, we in the Department of Defense have a lot of stovepipe systems. In fact, we are predominantly still stovepipe functional in that area, and I am hoping they will kill some of those systems, many of them duplicated, such as accounting systems, and so on and so forth.

Mr. HORN. Mr. Paige, I just want to get for the record, is TOA "time of arrival"?

Mr. PAIGE. No; total overall appropriations.

Mr. HORN. OK, Total overall appropriations. That is the Defense word for what you get out of us, out of anybody. OK, got it. It is in the record.

Mr. PAIGE. Some of those other committees.

Mrs. MALONEY. I would like to ask the agency representatives and Ms. Adams if you would like to comment. Do you have an inventory of programs, platforms, and languages for your Department, and does that inventory identify the users of each application?

Mr. MESTERHARM. Yes, we do have an inventory. The library system that is the central repository for all of our software in their language is what we are using as our data base for searching the actual source code. The majority of our applications, as was indicated by Mr. Schick, are in COBOL, with a small amount in Assembly language, and a few others in Fortran, and so forth and so on, but the vast majority is in COBOL.

Mrs. MALONEY. Do you identify the user of each application?

Mr. MESTERHARM. Yes, we do.

Mrs. MALONEY. I would like to ask Mr. Muñoz and Mr. Paige, who at your agency is in charge of the year 2000 conversion, and does your agency have a year 2000 project office? And if so, does that manager have other responsibilities, or are they just focusing on this particular problem?

Mr. PAIGE. Within the Department of Defense, there is an Assistant Secretary of Defense C4I and the CIO. I have overall responsibility.

Within my office, I have a project officer, and yes, he does indeed have additional programs and assignments. Everybody in OSD has multiple projects and missions that they are responsible for taking care of.

Mr. MUÑOZ. In the Treasury Department, under my office, the Assistant Secretary of Management and Chief Financial Officer, I have a deputy whose full-time job is information technology. It is the Deputy Assistant Secretary for Information Systems, Dr. Bill Choy, who is with me today, right behind me, and he is spearheading the year 2000 project. He has brought a council together of all the bureaus and put milestones for each of the bureaus to come forward in assessing and having a full conversion, with testing being done at the end.

That council meets frequently. I think the last meeting was several weeks ago with respect to some of the questions.

The question on inventors I—we have had several of our bureaus. As you know, we have 12 bureaus. About four of them have completed all of their inventory, and the rest are in process.

We have a very good proactive system in terms of doing—doing what needs to be done in this area.

I was just notified—back to the chart, you asked if the Navy was included in this chart. We excluded the Navy just to show its size, and, in showing it, we excluded it from the DOD calculations so we don't double count.

Mr. HORN. Let me just ask you to clarify the answer you gave to the ranking minority member. The gentleman you described as the person handling information, the Deputy Assistant Secretary,

has he been designated as Chief Information Officer for the agency?

Mr. MUÑOZ. The Secretary has not signed off on who the Chief Information Officer will be.

Mr. HORN. Will that individual in the Treasury report directly to the Secretary and Deputy Secretary?

Mr. MUÑOZ. Those determinations have not been finalized as of yet, but we are in the process of making some of those decisions.

Mr. HORN. I think when Congress stressed the need for a Chief Financial Officer—and you and I have been down this road several times—and now stresses the need for a Chief Information Officer, the thought in our mind and my predecessor's mind also certainly is, we want people who cover major areas that are very complicated, that can report directly to the powers that be and not be lost somewhere as just part of a management structure, as interesting as that is.

And we want people that can give their full-time attention to these major problem areas, because that is where we go wrong if we don't devote that resource and getting through the bureaucracy, as evidenced by the consultants in the private industry as well.

It is hard to get that message to the powers that be on top of the big building, wherever they roost. We need to get those lines going and say that is the person that knows about technology and that is the person that knows about finance and let's deal with it, because only those people can get the rest of that agency saying, "This is a serious thing; let's deal with it."

Go ahead. Sorry.

Mrs. MALONEY. I would just like to—my time is up but——

Mr. HORN. Keep going.

Mrs. MALONEY. The two representatives of an agency, whether or not you believe the problem will be fixed in your agency by 2000, or will your agency be like Kevin Schick described earlier where 30 percent of the systems in place today will not be fixed, he predicts, in many agencies?

If that is the case, have you prioritized your applications and determined which ones can be set aside if all cannot be modified by 2000?

But first I would like to know whether you feel you will reach that goal.

Mr. MUÑOZ. Absolutely. The Treasury will have zero tolerance for having no conversions taking place that need to take place, which means we'll be testing all our systems and making sure they are compliant.

But to answer your second question, in terms of how we approach it, we will certainly. We are in the process of prioritizing. We know that certainly the Internal Revenue Service, Financial Management Service, as well as enforcement bureaus are in the process of prioritizing to make sure we tackle those as quickly and early as possible to make sure the testing gets fully done.

But the Treasury Department is confident we will meet this challenge and we will be compliant.

Mr. PAIGE. Within the Department of Defense, I am convinced that all of the major systems—those are the standard ones in each

of the functional areas—will meet the time line and be there ready to go.

In terms of prioritization, I expect again the functionality owners of those systems, the people that pay the bill, they will prioritize.

I will prioritize those within my functional area, such as communications and intelligence functional areas, to be sure that we get the ones that need to be there on time. I don't have any doubts about that.

Mrs. MALONEY. And finally, if anyone would like to comment on, how did we make such a stupid mistake?

Mr. PAIGE. I am not going to agree that it is a stupid mistake. But I think we are the victims of technology, and as technology continues to move, we will see more of these types of things that we look at now and classify them as mistakes.

But back when two digits were being used, as Mr. Schick stated this morning, people were out trying to get the job done, trying to build the systems in the most efficient manner possible. Dollars have never been unlimited, and the conservation of memory was important then. Today, as technology has changed, things are different, but it really wasn't a stupid decision, mistake.

Mr. MUÑOZ. I think that is so important too. This Committee realizes when it publishes its report, on one hand, we should congratulate the productivity and hard work by many programmers making sure that data was being processed as effectively as it was in the most economical way. It was. I believe those programmers should be congratulated.

We should look at it as an opportunity, and I believe that this early hearing, Mr. Chairman, that you have called will, in fact, convert this from a problem to an opportunity, because all of us now will be doing things that may be good management, should all be doing, inventorying your systems, making sure you do a cost-benefit analysis. Perhaps some things have to be junked and the new technology brought in.

Second, all of our efforts that this Congress has spoken about—such as the GPRA, creating data that is more relevant for the customer, some of that data which require systems that have relational data capabilities are not in place yet, and there has not been a reason to go back and pay attention to it.

As we address this problem, if we take a big-picture attitude, we can make deadweight data that could not speak to each other, was not relational-based data, we can now make it relational-based data and end up with performance reports and much more relevant data.

So I see it as an opportunity, and thank goodness double "0" will be here. It will force this kind of good management.

Mrs. MALONEY. Thank you very much, Mr. Chairman.

Mr. HORN. Along the line, the opportunity, let me ask a real dumb question that every 14-year-old watching will say, "Doesn't he know more about computers than that?"

Scanners. I have been waiting for sort of the perfect scanner that will take a book and translate that into a computer. They are getting better. They used to be botched and you would have to watch every sentence.

But this is one way that perhaps that problem can be solved. Is the development of scanning techniques that take the whole data base, reformulate it? Is that even possible technically now? Have your people found out on this so you take the two-digit automatically extended to a four-digit year?

Is there any possibility of doing that, just scanning through your data base or whatever time you see four numbers lumped together, unless it is a missile system——

Mr. MESTERHARM. Not with scanning.

The problem really is that a number of programs have been developed in a specific language, and those programs then are dealing with data that they expect in a certain format, and the only way to deal with that is to change that program.

Now, in relation to a scanner going through and looking at the data, in fact, that's one of the tools that is available. It will scan all that source code, it will identify by the tag each piece of data that has an address or a house that it lives in. There is a name for that house, and it has its particular size for that.

Now, you'd have to be able to trace all of those names throughout a program, and when you move data from one location to another, one house to another, its name changes because it has a new tag to move into that new location. The only thing that the scanning programs help do now is help trace that so that you know a date field was moved from one location to another.

Those types of programs are going to save somewhere in the area of 20 to 25 percent in the overall manual time it is going to take to do this.

But as was said earlier by Mr. Schick, the tools are there and they help the situation. It is not the real solution to the problem. Most of the solution is that you have to actually look at all the code.

Mr. PAIGE. The scanner that you were talking about scans hard copy, and that's different and would not be of value in scanning data base.

Mr. HORN. It doesn't work like Spellcheck then, which at least finds things you have to think about.

We mentioned the Office of Management and Budget's role. Is there anything else that they should be doing that would be helpful to you? What else can they do? They apparently are asking for help and asking for estimates now.

Mr. PAIGE. Today, from where I sit, I believe truly that OMB is doing what OMB should be doing and no more. I see no reason for them to get any further involved except to spotlight the problem, and if they do that and if for some reason one of the agencies of government cannot reprogram resources to correct the problem, if we have to go to OMB as a part of one of our programs, and I asked for resources, at least they will be a part of it and understand what it is and why we are asking for the money.

I think today that they are proactive and certainly would not criticize them.

Mr. HORN. Any other suggestions?

Mr. MUÑOZ. I believe they have taken the leadership by starting the Interagency Council, and it needs to be expanded, as the testimony suggested. But I agree with Mr. Paige, because our systems

are so different, they address different needs, clearly some internal needs and some external needs, and it is best left to the agency to solve those.

Mr. HORN. So you believe in devolvement, maybe not to the States but to the agency. So you are right.

Mr. Paige, in your testimony you noted that the specialized computer chips in weapons, like missiles, are microchips containing tight compliance software. However, you note the microchips used in the missile systems may no longer be in production. Since they are no longer in production, could there be malfunction after December 31, 1999?

Mr. PAIGE. No. I am convinced that the emphasis we are placing on it, not only in the business and administrative systems with emphasis on weapons systems, will cause the commands, the R&D activities that are responsible for the life cycle support, to go in and find the equipment, the chip or processor, whatever is necessary to modify the weapons systems so that they can do the job for which they were intended.

Mr. HORN. So there is no danger that even under the existing system there will be a malfunction in the year 2000 on weapons systems?

Mr. PAIGE. No. That is our highest priority in terms of——

Mr. HORN. Given the fact we have NATO allies and we have tried to get standardization throughout NATO and all the rest, are our allies working on this in their areas of jurisdiction?

Mr. PAIGE. To be honest with you, Mr. Chairman, I have not concerned myself with our allies and how they are going about it.

With our weapons systems that we have sold to our allies, we will be sure that they know, as we make changes and fixes to them and those that might be vulnerable—we will be sure that they know that. But what they are doing to take care of their business systems and systems that they are on and did not get from us I have not——

Mr. HORN. I am talking just about defense systems. Presumably NATO's unified command is assuring that we proceed the same way with both our systems in Europe and our allies' systems in Europe, all of which have to be integrated with an overall system.

Mr. PAIGE. I can assure you that the command in Europe, that in NATO, SHAPE headquarters, that they understand that the problem exists.

Some of the more senior people have been recipients of electronic mail from me over the past year talking about the problem, and I continue to send mail to Europe that says don't get caught short; don't let it happen to you.

Mr. HORN. Commissioner, I wonder, you have spent 100 man years on the issue in Social Security so far. Is that correct?

Mr. MESTERHARM. That is correct.

Mr. HORN. From 1989 to now.

I guess I am curious, has it been difficult to run your current operations while simultaneously analyzing and correcting the problem? And if so, do you have any suggestions for other agencies as to how you handle that?

Mr. MESTERHARM. Yes, there has been some difficulty. I think the difficulty has basically centered around—I think some of the

other people have talked about some of the issues—some of the changes you can make in maintenance if you are making major changes to a given program or system—those you can make part of your actual change, so you can make it not intrusive to what you are trying to accomplish.

Other areas where you don't have a lot of maintenance, you are going to be forced to schedule an actual change for that. I think that is where some of the focus has been in some of the areas that people tend to say, "I am just going to change this along with maintenance."

I think in the late 1980's or early on in the 1990's we were taking that position, and we had to take a more proactive position because you don't get to a lot of the codes that way and you have to plan out and really schedule everything.

If I gave any advice, it would be to do that planning up front and get your plan laid out for everything. Some of it can be done with maintenance, but that is a small percentage of the total.

Mr. HORN. Would anybody like to add to the comments the commissioner has made on this from your own experience?

Mr. PAIGE. I would concur.

Mr. HORN. It seems to me it is very wise advice, and I am glad they are tapping into your Committee, Ms. Adams. I think that would be helpful to get everybody on board.

Let me just include at the end of this hearing, we have statements from Congressman Davis and Congressman Flanagan for the record, opening statements, that will be put in as if read.

[The prepared statements of Hon. Thomas M. Davis and Hon. Michael Patrick Flanagan follow:]

STATEMENT OF CONGRESSMAN TOM DAVIS ON YEAR 2000 HEARING

Mr. Chairman, I want to commend you and your staff for organizing this hearing today on an issue of such vital importance. This will be the first Congressional hearing held on this issue, but I am certain it will not be the last. If we needed additional evidence that the U.S. has entered the Information Age, this morning's session will remind us of the vital role computers play in our lives.

The Year 2000 software conversion, at first glance, seems like a purely technical fix--and one that is not particularly challenging. As we will learn this morning, however, the real challenge is one of program management where the date fields have to be corrected--not only in a company or agency's computer system--but in all the systems they interact with. This task, therefore, becomes incredibly complex--and time is running out to complete the needed conversions. Only 1354 days remain until the Year 2000.

The key questions I will keep in mind as I listen to today's experts are the following:

1) As members of this Subcommittee, what can we do to ensure that the federal agencies are able to deliver their essential services to the citizens in the Year 2000? Do they have sufficient funds? Will the fiscal '98 budget cycle be too late to allow the agencies to complete this task? Where can the estimated $30 billion be

found?

2) As a Member with hundreds of federal contractors in my District, I am concerned what will be the effect on these firms if agencies have to divert funds from current projects to fund the Year 2000 conversion? What impact will there be on government efficiency if these modernization projects are postponed beyond the Year 2000?

3) Last, but not least, what responsibility do we have as Members of Congress to ensure that the critical services our citizens rely on--oil, gas, electricity, telecommunications--will be delivered without interruption. Also, we must ensure that our national security is not at risk due to the present of two-digit fields in our missile systems. But what about our allies, our enemies? Will their systems be fixed in time? If not, what could occur?

Again, Mr. Chairman, I commend you for holding this hearing and I look forward to hearing from our panels of expert witnesses.

Opening Statement
Representative Michael Patrick Flanagan
Subcommittee On Government Management, Information & Technology
Hearing April 16, 1996

Mr. Chairman, I would like to commend you for calling this hearing to explore Congress' role in fixing the pending problems with computers when the year 2000 arrives. We must look at our systems and the global computer system to decide how we should approach this potential failure and what we may do to correct it.

This is an extensive problem which will have an effect not only on business and our economy, but also the people who receive benefits - citizens receiving Social Security, our Veterans and their benefits and many more. What is so damaging about this pending failure, is the potential it has to hurt the people who most depend on our services.

Again, Mr. Chairman, I thank you for calling this hearing and look forward to hearing all of the testimony.

Mr. HORN. Let me just say in my general conclusion, I think, Mr. Paige, you summed it up marvelously well in your own statement that there is much work to be done and much needed coordination by those doing the work, and we have limited resources, and we have an immovable deadline. There can be no schedule delays. Significant resources will likely be required to find, fix, test date-related processing in our thousands of systems and hundreds of millions of lines of code, and we must establish priorities for our efforts.

I think you very well put the problem and the opportunity Mr. Muñoz stressed.

I will note on behalf of the subcommittee and the full committee that this committee will continue its investigation of the problem. We would like, for example, Ms. Adams the minutes of your Committee, and we will ask OMB for the copies of the departmental submissions to make sure things are on track. We will be issuing a report on it and will hold further hearings if necessary.

In the meantime, I thank you four witnesses for your help, and in conclusion of the hearing I want to thank the staff that prepared this on both sides of the aisle.

The majority staff is headed by the chief counsel/staff director, Russell George, sitting back against the wall there on my left. The immediate responsible staff member is Susan Marshall, to my left, the procurement specialist for the committee. And of course we have had the good help of the counsel to the subcommittee, Mr. Mark Uncapher, as well as Andrew Richardson, our clerk. It takes a lot of movement of paper around here to get something accomplished, and Andrew is very good at that.

For the minority staff, we thank that long row to my right over here: David McMillen, professional staff member; and Mark Stephenson, professional staff member, and Liza Mientus. And I am missing somebody. Who am I missing? Tina Mazon—all right, Tina; thank you. And we thank our official reporters, the two of them, Katie Stewart and Ray Boyum.

With that, this meeting is adjourned.

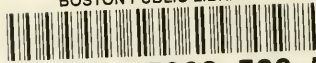[Whereupon, at 12:25 p.m., the subcommittee was adjourned.]

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